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US ARMY, FM 55-450-5
US MARINE CORPS, FMFRP 5-31, VOL III
US NAVY, NWP 42-1, VOL III

US AIR FORCE, AFR 50-16, VOL III
US COAST GUARD, COMDTINST M13482.4

Chg. 1
S/S by FM 10-450-5, dtd 30 August 1999

MULTISERVICE HELICOPTER EXTERNAL AIR TRANSPORT: DUAL-POINT LOAD RIGGING PROCEDURES

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Washington, DC, 11 February 1991

MULTISERVICE HELICOPTER EXTERNAL AIR TRANSPORT: DUAL-POINT LOAD RIGGING PROCEDURES

PREFACE

This manual is one of a series of manuals for aviation and ground personnel who perform helicopter external air transport (HEAT or sometimes referred to as EAT) missions ashore or aboard ship. Its companion manuals in this series are *Multiservice Helicopter External Air Transport Basic Operations and Equipment* and *Multiservice Helicopter External Air Transport Single-Point Load Rigging Procedures*.

This manual is a coordinated effort of the US Army, US Marine Corps, US Navy, US Air Force, and US Coast Guard. All services participate in the external air transport (EAT) certification program begun by the Army in 1984. This manual includes standardized rigging procedures and other information from that program. Chapter 2 contains rigging procedures for dual-point loads that have been certified for EAT. Chapter 3 contains rigging procedures for dual-point loads that have not been certified but have demonstrated acceptable static lift and flight characteristics during a flight test.

Efforts were made to standardize ground crew and hookup procedures and terminology. Where service-unique requirements apply to an entire chapter or body of text, the service initials are at the beginning of the chapter or text. Otherwise the initials are at the end of the applicable sentence.

Rigging equipment described in this manual may not be authorized for all aircraft or services because of equipment or service restrictions.

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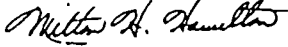
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Load Rigging Procedures (Qty rqr block no. 4649).

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CHAPTER 1

FUNDAMENTAL PRINCIPLES

This chapter contains general information about certification for helicopter external air transport (EAT) and explains the role of the Military Traffic Management Command Transportation Engineering Agency (MTMCTEA) and the Department of Defense (DOD) EAT certification authority. This authority rests with the US Army Natick Research, Development, and Engineering Center (NRDEC). This chapter also explains the information contained in the equipment rigging procedures and gives some general rigging instructions.

CLASSIFICATION DEFINITIONS OF EXTERNAL AIR TRANSPORT LOADS

Certified EAT Loads

Certified EAT loads are those items of equipment and their associated rigging procedures which have completed the evaluation and testing required by NRDEC for EAT certification. These rigging procedures are in Chapter 2. Only certified EAT loads are authorized for the Marine Corps.

*The US Army NRDEC has indicated that any external load certified under a specific rotary aircraft designation (for example, CH-53 helicopters) is also certified under all models within that designation (for example, CH-53A/D/E helicopters). The following restrictions apply for EAT certification to remain in effect:

- The load must be within the lifting capability of the desired helicopter model.
- The load shall be rigged according to the certified rigging procedure.
- The maximum stable airspeed limitation specified for the load in the applicability section of the rigging procedure must be adhered to.

- This certification is limited to single-point loads only.
- This certification does not apply to helicopters of different designations (for example, CH-47 versus CH-53E helicopter) because of possible differences in dynamic differences in dynamic vibration helicopter/load mass differential and rotor wash pattern.

Suitable EAT Loads

Suitable EAT loads are those items of equipment and their associated rigging procedures that have not been certified but have demonstrated acceptable static lift and flight characteristics during a flight test by the US Army TEXCOM Airborne and Special Operations Test Board. In most cases, the lifting provisions have not been tested according to the applicable military standard. These rigging procedures are in Chapter 3.

Unique EAT Loads

Unique EAT loads are items of equipment and their associated rigging procedures which have been certified or determined to be suitable for EAT but have significant changes to a load parameter, such as weight or a change in the aircraft used to carry the load, such as a load certified with a UN-60 and now carried under a

CH-46. Unique loads are also equipment carried on a onetime or low-frequency basis, such as telephone poles, artillery targets, or barrier material.

Prohibited EAT Loads

Prohibited EAT loads are items of equipment that are prohibited from EAT as determined by each service. These loads have been denied EAT certification and are a safety hazard if carried. They have either structural deficiencies or have exhibited unstable flight characteristics during flight testing. Each service will identify these loads and transmit this information by separate list.

Contact your service point of contact identified in the preface if you have any questions regarding the classification of a particular load.

CERTIFICATION OF EQUIPMENT FOR HELICOPTER EXTERNAL AIR TRANSPORT

The objective of helicopter EAT certification is to assure the user that the equipment being transported can withstand the stresses of an EAT flight environment. Certification for EAT assures the user that the item has met minimum standards for structural integrity and that the associated rigging procedures have been developed specifically for that item.

Within the US Army, the MTMCTEA is responsible for transportability approval of developmental equipment. Within the DOD, NRDEC is the lead activity responsible for providing EAT certification and rigging procedures for military equipment. When an item is certified for EAT, it means that NRDEC, in cooperation with various test activities, has —

- Conducted an engineering analysis of the load and lifting provisions for structural adequacy during EAT.
- Verified that the lift provisions meet the strength requirements of the applicable military standard by means of proof load testing.

- Developed and/or validated EAT rigging procedures through static lift testing.
- Evaluated flight test reports and determined that the particular load meets acceptable flight characteristics with the type helicopter flown during the flight test.
- Issued a statement of EAT certification for the particular load, including load configuration(s), weight(s), types of helicopter(s), and maximum stable airspeed(s) as attained during the flight test(s). Certification is valid only for the conditions specified in the rigging procedures.

REQUESTS FOR EAT CERTIFICATION

Fielded Equipment

Each service headquarters must designate, request, and prioritize the fielded equipment to be evaluated by NRDEC for EAT certification. The following agencies are responsible for their branch of service:

- US Army - US Army Transportation School, ATTN: ATSP-CD, Fort Eustis, VA 23604-5391.
- US Marine Corps - Marine Corps Research, Development and Acquisition Command (MCRDAC), ATTN: Code SSE/T&E, Quantico, VA 22134-5080.
- US Navy - Naval Air Systems Command (NAVAIR).
- US Air Force - US Air Force Systems Command.

Individual units can request EAT certification for fielded equipment through the appropriate service agency which will add the item to the prioritized list. The NRDEC will evaluate the equipment on a priority basis.

Previously Certified Single-Point Loads

Organizations can request certification for single-point loads transported by helicopters not listed in the applicability paragraph of the certified single-point load rigging procedure. The procedure for certifying a single-point load for EAT under a different helicopter from that listed in the applicability paragraph is as follows:

- Contact your service point of contact to determine if the load has been certified with the different helicopter subsequent to the manual publication.
- Obtain a multiservice flight data collection sheet (MSFDCS) from Commander, NRDEC, ATTN: STRNC-UAS, Natick, MA 01760-5017.
- Following the steps in the MSFDCS, conduct a flight test for the item using the certified single-point rigging procedures in this manual.
- Complete the MSFDCS and return it to NRDEC. NRDEC will evaluate the completed MSFDCS and certify the item as appropriate for the specified helicopter.

Previously Certified Dual-Point Loads

Loads cannot be certified for dual-point lift based on previously certified dual-point rigging procedures because of the differences in dual-hook helicopters, such as the distance between the two cargo hooks. Rigging procedures for dual-point loads must be developed and/or approved by NRDEC before the test flight.

UNIQUE ITEMS OF EQUIPMENT OR OPERATIONAL REQUIREMENTS

Helicopter external air transport of unique items, due to operational requirements, will be at the discretion of the commander. Equipment not listed in this manual should be static lifted (when possible) by a crane to determine proper rigging and stability characteristics. Personnel thoroughly familiar with EAT rigging procedures should assist in the static lift

testing. Flight testing may be conducted after a satisfactory static rigging configuration has been determined.

Suitable loads that have been routinely and safely flown in the past will continue to be flown if units are to accomplish assigned missions. The lack of EAT certification in itself does not preclude a unit commander from carrying a load that is not certified. Each service is responsible for determining its policy on carrying loads that have not been certified for EAT.

NOTE: Low density equipment with low weight and large surface area (flat surfaces), such as shelters, empty trailers, pallet loads, and empty fuel or water drums, are likely to become extremely unstable when flown during EAT, even at low airspeeds, and should be flown with extreme caution.

EQUIPMENT RIGGING PROCEDURES

This section explains the information that is contained in the rigging procedures for each load. Chapters 2 and 3 contain the rigging procedures for certified and suitable single-point loads, respectively.

Applicability Paragraph

The applicability paragraph states whether a load is "certified" or "suitable" for EAT. It also contains the helicopter types and recommended maximum airspeeds for each helicopter type. For certified loads, this airspeed is the maximum airspeed attained by the helicopter during the test flight before the load became unstable or before the aircraft power requirements were exceeded. For suitable loads, the maximum recommended airspeed is based on previous experience with this helicopter/load combination. For either certified or suitable load, the airspeed listed is a recommendation and not a restriction, unless so stated. The aircrew should closely monitor the load during the flight, especially if the helicopter exceeds the recommended maximum airspeed.

Load Description

The load description paragraph identifies the load, model, national stock number (NSN) or other identification, and the weight of the load for certification. The actual weight of the equipment may vary somewhat from the actual rigged weight during the flight test due to equipment modifications, fuel, equipment added to the load, or different models of the same item. The load weight on the equipment data plate or in the operator's manual takes precedence over the load weight in this manual. Weigh the load if there is any doubt about its actual weight. If the load weight exceeds the weight listed in the load description paragraph, the load becomes a unique load. Contact your service point of contact if you have any questions about the load description or weight.

Equipment such as cargo trailers and cargo trucks contain descriptions of the allowable additional cargo weight. Do not exceed the fully loaded weight. Some trailers become extremely unstable at low weights; therefore, a minimum weight is identified. If your trailer is below that weight, add more cargo or dummy weight as close to the center of the trailer as possible until you reach the minimum weight.

Preparation

The preparation steps are intended to reduce the possibility of damage to the equipment caused by sling leg entanglement during the hookup and lift-off operation or by wind resistance encountered during the flight. Since these preparation steps are not directive in nature, the commander assumes responsibility for any damage to the equipment caused by deviation from the preparation step.

Rigging

The rigging steps give information as to the position of the apex fitting on the load, routing orientation of the sling legs, location of the lift provisions, chain link number for each sling leg, and steps required to prevent the sling legs from becoming entangled on the load. Do not change the chain link number in the rigging procedures

under any circumstances as it may change sling leg loading and cause lift provision failure.

The purpose of the illustration accompanying the rigging procedures is to show what a properly rigged load looks like with the slack removed from the sling legs. The arrow identifies the direction of flight.

Appendix A contains NSN component listings for slings, sling sets, cargo nets, and other miscellaneous equipment and materials.

GENERAL RIGGING INSTRUCTIONS

WARNING

Inspect lifting provisions and supporting structure for damage or degradation prior to EAT. Do not transport loads with damaged or degraded lift provisions.

Prepare the load to be transported by following the preparation and rigging instructions for each item. Typical preparation instructions will provide information to secure loose items, remove or secure canvas covers, and remove obstructions, such as antennas. Place protective padding on windshields and other components that could be damaged by the metal parts of the sling set during hookup or release. The load should be secure enough to withstand winds in excess of 120 knots caused by the forward airspeed of the aircraft. If possible, position the load in the takeoff direction so the pilot does not have to pick the load up and then turn the aircraft into the takeoff direction.

Assemble and inspect the sling and miscellaneous equipment required to prepare and rig the load. Following the instructions in Chapter 6 of the first volume in this set, add or remove sling legs, chains, or apex fittings as required. Never exceed the capacity of the sling legs or apex fitting/web ring. If you have a sling set with a higher capacity than the sling set prescribed, use the chain link conversion chart in Appendix B to determine the corresponding chain link for your sling set.

Position the sling set near the load. The sling legs for a typical load with four lifting points are routed as shown in Figure 1-1.

Rigging a typical load with four lifting points is begun by connecting—

- Sling leg 1 to the left front lifting provision.
- Sling leg 2 to the right front lifting provision.
- Sling leg 3 to the left rear lifting provision.
- Sling leg 4 to the right rear lifting provision.

If a six-leg sling set is required, the inner-most sling legs, 5 and 6, are connected to the left and right middle lift provisions.

Odd numbered sling legs go to the same side of the load.

Left, right, front, and rear directions are designated from the driver's perspective for vehicles and towed equipment. Howitzer gun tubes are considered the front of the load. The front or rear is identified on other items of equipment. The sling leg numbering system prevents sling legs from crossing each other and causing damage to the sling legs or causing the load to twist in flight. To improve flight stability, some loads are transported backwards. Do not confuse the front of the load as it is carried with the end designated as the front for rigging purposes. The arrow with the illustration identifies the direction of flight. Following the equipment rigging procedures, loop the free end of the chain end through the lift provision and insert the specified chain link in the grabhook/grab link. Tie or tape

the excess chain end to prevent the unrestrained chain from damaging the load. If necessary, wrap padding around the chain or rope assembly to prevent damage to the load or sling set. If the procedures prescribe a spreader bar, install and pad it according to the rigging instructions.

Breakaway technique tape/cotton webbing is used to temporarily restrain the sling legs to keep them from becoming entangled on the load as the helicopter lifts the load.

A-22 CARGO BAG RIGGING INSTRUCTIONS

*The A-22 cargo bag is an adjustable cotton duck cloth/nylon and nylon webbing container consisting of a sling assembly, cover, and four suspension webs. The bag is used to transport palletized loads, loose cargo, ammunition, drums, and other general cargo. Maximum weight capacity is 2,200 pounds. The weight of the A-22 cargo bag is 58 pounds. You may rig the cargo in the bag with or without the cover.

The best way to learn about this carrying device is to rig and derig it several times. Figures 1-2 through 1-6 and the following steps explain how to rig an A-22 cargo bag:

Step 1 - Spread the suspension web assembly on the ground near the cargo to be transported. Make sure the lateral straps are facing the ground. The fat lip portion of the friction adapter on the suspension web assembly must face down to ensure correct rigging when the cover and suspension assembly are folded up around the load.

Step 2 - Center the cover (lacing loops/eyelets down) on the sling assembly, making sure that the cover edges are even with the scuff pad of the suspension web assembly.



Figure 1-1. Sling Leg Lifting Point Designation

Step 3 - Center the load on the canvas/nylon cover (Figure 1-2). Place the load so that any sharp corners or objects are toward the center of the load, if possible. Use cushioning material to protect the cover, if necessary.

Step 4 - Fold the panels of the canvas/nylon cover over the top of the load. Fold any excess cover material under the top flap.

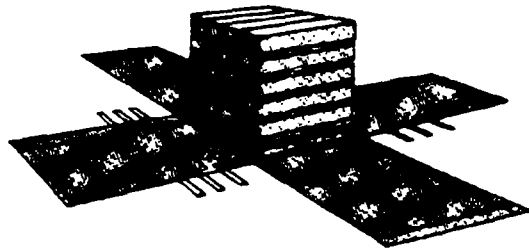


Figure 1-2. Centered Load

Step 5 - Using lacing cord or Type III nylon cord, secure the cover at each corner by running the cord through the lacing loops in a figure-eight design (Figure 1-3). Tie the cord ends with a bow knot and secure. The purpose of the cord is to tighten the cover around the load so that small items cannot fall out.

Step 6 - Route the 188-inch strap over top of the load. Route the free end under the floating safety bar (smooth side) and back over the friction adapter (rough side). Tighten the strap, fold in 8- to 10-inch loops, and secure (Figure 1-4).

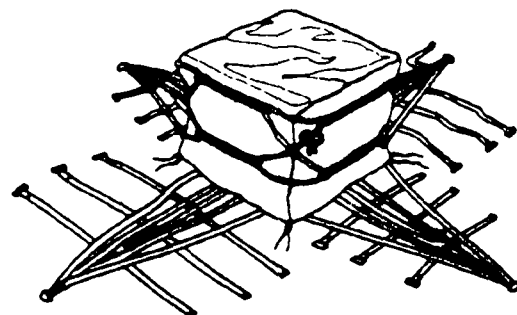


Figure 1-3. Securing the Cover with Lacing Cord

Step 7 - Pull the lower lateral straps to the corners of the load. Route the free end under the floating bar and back over the friction adapter.

Attempt to tighten all four lower lateral straps equally. Repeat this step using the middle lateral straps.

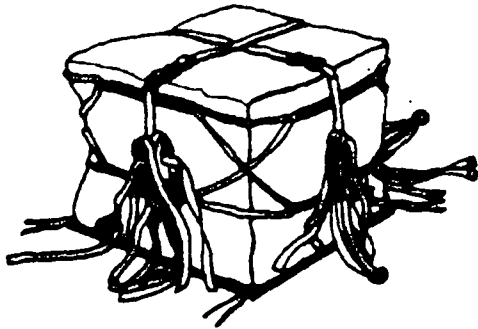


Figure 1-4. Securing the Strap

Step 8 - Fasten the upper lateral straps in the same manner as in step 7 (Figure 1-5). If the load is not high enough for the upper lateral strap to go around the load, pull the suspension webs to their full height, and fasten the upper straps diagonally across the top corner of the load. Strap fasteners should be tightened to within 4 to 5 inches of the upper lifting leg.

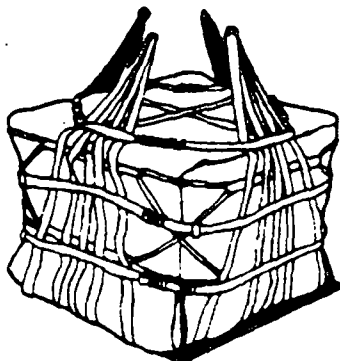


Figure 1-5. Fastening Upper Lateral Straps

Step 9 - Connect the four snap fasteners on the 24-inch suspension web strap to the sling assembly D-rings. Make sure the open or hook side of each butterfly snap is facing inward. Tape each butterfly snap to prevent the hooks from becoming entangled on the nylon cord or straps.

Step 10 - Attach the four suspension web strap D-rings to a medium clevis in a clockwise sequence. Each strap can have a maximum of one twist to connect to the clevis (Figure 1-6).

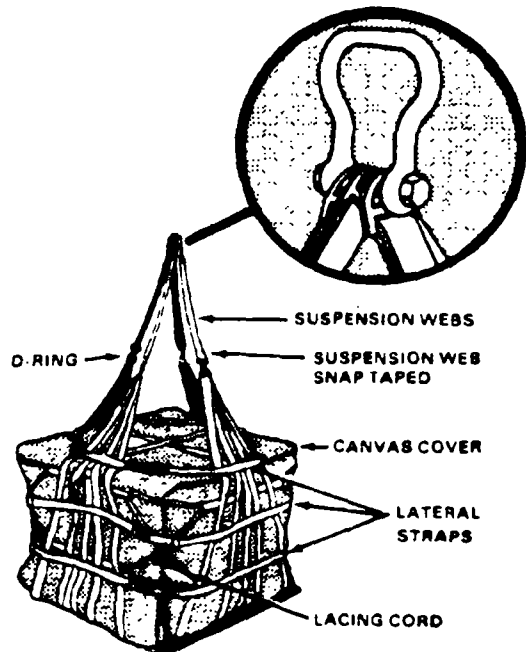


Figure 1-6. Upper Sling and Medium Clevis

Step 11 - Adjust all straps until the sling assembly fits snugly around the load. Fold and secure any excess webbing.

Step 12 - Prepare the load for pickup by looping the chain end of a sling leg through the medium clevis and inserting link 3 in grabhook.

CARGO NET RIGGING INSTRUCTIONS

The 5,000- and 10,000-pound capacity octagon-shaped cargo nets are constructed from interwoven nylon cord. Each set of four lifting legs has a hook that attaches to the apex fitting. The other ends of the lifting legs are attached to the outer border

cord. The apex fitting can be connected directly to the aircraft cargo hook. A diamond-shaped load zone area is marked by a yellow cord interlaced with the net mesh. This zone marks the center of the net and is used as a guide to place the load. When positioning the load, the sides of the load can extend beyond the load zone, but the overhang should be the same on each side. The apex fitting is attached by a tether cord to the set of lifting legs with the net identification tag.

The olive drab body of the 5,000-pound capacity cargo net is 15 feet wide. Mesh size is 6 inches, and the net weighs 58 pounds. Volume capacity is 125 cubic feet.

The 10,000-pound capacity cargo net is black, and the body is 18 feet wide. It is constructed from a heavy weave nylon braid with 7 1/2 inches between mesh. The net weighs 96 pounds and has a volume capacity of 380 cubic feet. When preparing to rig a net, remember the following rules:

- Never exceed the weight limits of the net. Do not transport cargo having sharp edges or protrusions without first covering the edges so they will not damage the net.
- Do not carry small items that could slip through the mesh. Use a canvas liner.

Follow these instructions when rigging the net:

Step 1 - Spread the net out on the ground. Have four persons pull evenly on each of the four lifting legs to open the net to its fullest extension over the spot where the net is to be loaded (Figure 1-7). This will prevent overlap of the net under the pallets or load.

Step 2 - Inspect the net. Repair as necessary. Inspect the pallet or load and make sure that banding material and pallet frame will not puncture, cut, or tear net. Tape over sharp edges with pressure-sensitive tape.

CAUTION: When forklifts are used to move pallets onto the nets, move the lifting legs to one side so that they will not be damaged by the tires. Do not allow the pallet or the under carriage of the forklift forks to drag on the net surface. The forklift forks could tear the net and pull it out from under the load. If the net is pulled out, the load may not be centered or could be unstable in flight.

Step 3 - Align the load on the net so that the sides of the load are parallel with the yellow cord (Figure 1-8). The load may overlap the yellow cord. The load's center of gravity will be near the

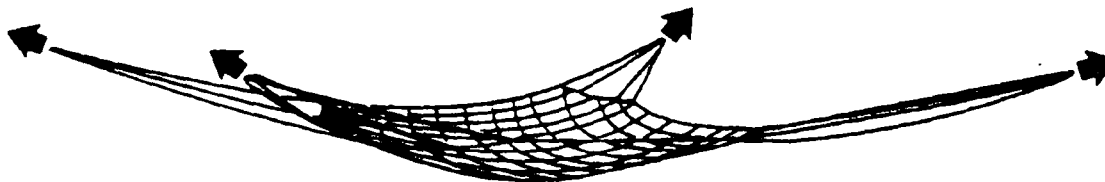


Figure 1-7. Fully Extended Net

center of the net. The lifting legs will be on the side of the load, not on the corners. If the load is loose cargo, place the cargo on the net with the heaviest items in the center and the lighter items toward the sides or on top of heavier items.

Step 4 - Position one person on top of the load with the apex fitting. Legs are hooked to the apex in the following sequence: 1, 3, 2, and 4, to provide equal lift on all legs (Figure 1-9). Hooks do not have to face in the same direction. After connecting all four hooks to the apex fitting, tape or tie the four hooks together to prevent them from coming unhooked when the apex is laid down (Figure 1-10).

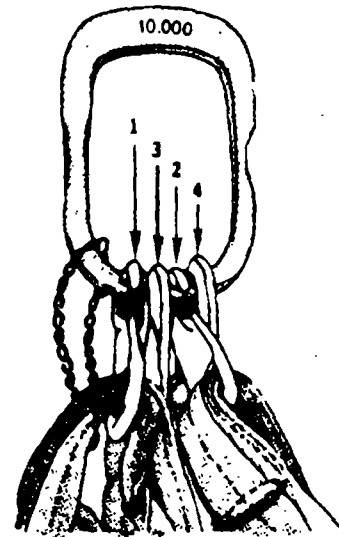


Figure 1-9. Legs Hooked In Sequence

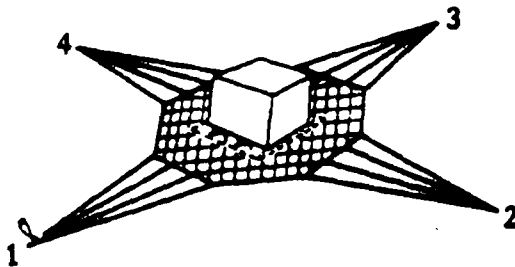


Figure 1-8. Aligned Load

Step 5 - All four sides of the net are now ready to be pulled up around the load. Begin by having the person on top of the load hold the apex up and another person tape or tie all 16 lifting legs together at 3- to 4-foot intervals until no more slack can be pulled up on the legs. If the load is small, you may have to tape or tie the net to together above the load. Tape or tie the legs and net so that the net does not snag on the load as the helicopter lifts the net (Figure 1-11). Use breakaway technique so that the tape or tie breaks after the slack is removed from the legs and net.

Step 6 - Lift the sides of the net up while taping the legs so that the net does not get caught on the pallet or load protrusions (Figure 1-12).

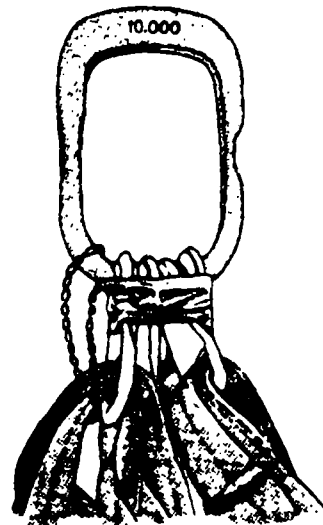


Figure 1-10. Taped Hooks

Step 7 - After you finish taping the legs, pull the net outward at each corner, grasp the border cord from each side near the corner of the load, and tape the border cords together to tighten the sides of the net. Take the excess netting at the

corner and tape to the adjoining side. At each side, pull the net up as high as possible and tape it to prevent it from snagging on the load and tearing the net (Figure 1-13). Use only enough tape to hold the net in place on the load. DO NOT tape net to load.

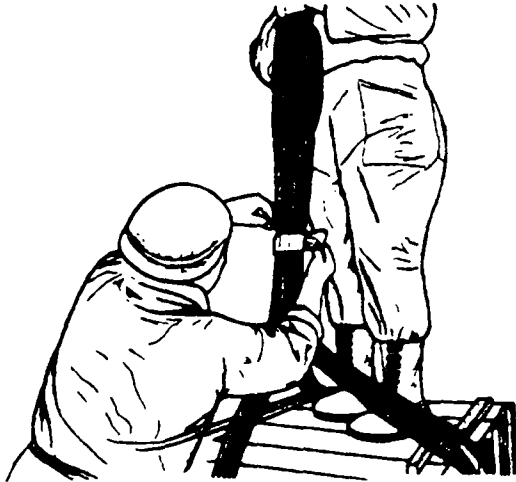


Figure 1-11. Taping Lifting Legs

into the pallet slots. Pallets can be stored temporarily with nets around them. They should not be stored on concrete. Place empty pallets on the concrete surface and set the netted pallet on top of it.

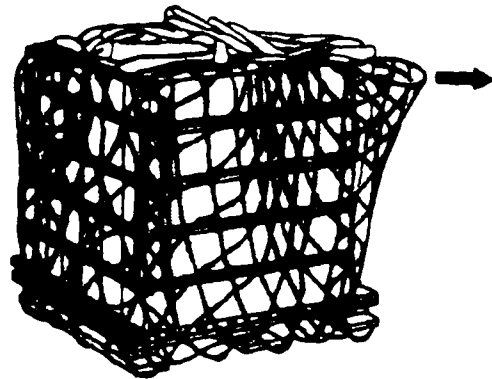


Figure 1-13. Excess Net Taped to Itself

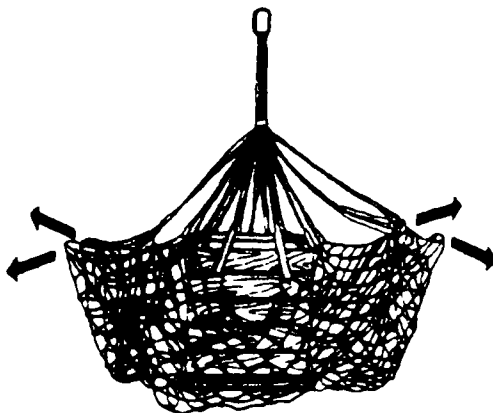


Figure 1-2. Net Pulled Outward from the Load

Step 8 - Coil the lifting legs on top of the load. The net is now ready for hookup to the helicopter (Figure 1-14). If the load must be moved, carefully guide the forklift forks through the net and

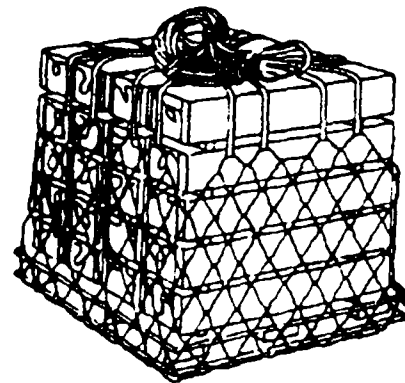


Figure 1-14. Lifting Legs Coiled on Top of Load

Step 9 - Normally the net apex fitting is directly attached to the cargo hook. If the load is a large one, the lifting legs may not be long enough to allow the hookup person to perform a safe hookup to the aircraft. If you cannot lift the apex fitting at least 6 feet above the top of the load,

add a leg or legs from a sling set (Figure 1-15). Route the chain end of the sling leg through the net apex fitting and insert link 3 in the grabhook. Remember, the capacity of the sling leg must be greater than the weight of the load.

Step 10 - Before hookup to the aircraft, make a final inspection of the apex fitting, netting, and taping to ensure the net and the load are still secure.

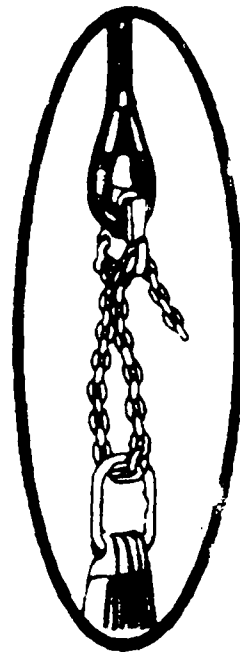


Figure 1-15. Adding a Sling Leg



CHAPTER 2

CERTIFIED DUAL-POINT LOAD RIGGING PROCEDURES

This chapter contains rigging procedures for dual-point loads that have been certified for EAT. Each rigging procedure is found in a figure that includes a description of the load, materials required for rigging, and steps to complete the procedure. An applicability paragraph is also a part of each figure and identifies certified loads. When the load is listed as suitable in the applicability paragraph, it has been flight-tested and is awaiting final certification in the near future.

WHEELED VEHICLES

The certified dual-point rigging procedures for wheeled vehicles are in this section. Figures 2-1 through 2-7 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-1. M151 1/4-Ton Truck

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 130 knots.

LOAD DESCRIPTION

- Truck, utility, 1/4-ton, M151A1/2, LIN X61244.
- Weight: 2,400 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Assembly, clevis, small, MS70087-1 (4 each).
- Padding, felt or suitable material.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Remove tarpaulin from truck, lower windshield, and secure to hood with nylon cord. Fold tarpaulin and secure on top of windshield with nylon cord.
- Fold top bows of truck and secure seats.
- Lower side mirrors flush with truck body with glass side in and tape to side of truck.
- Attach one clevis assembly to each lifting eye on all four wheels.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the hood
 - Loop the chain end of the left and right sling legs through the small clevis on each front wheel and insert link 5 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting on top of the rear seat.
 - Loop the chain end of the left and right sling legs through the small clevis on each rear wheel and insert link 5 in the grabhook.
- Wrap padding on the truck or chain where the sling leg chains contact the truck, if necessary.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set on top of the truck to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the front seat and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands in back of the truck and places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the truck and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

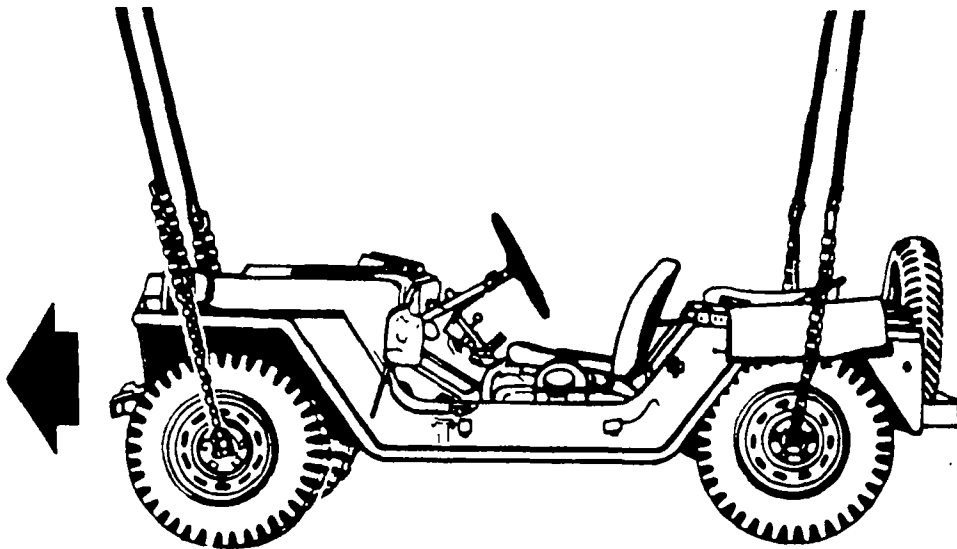


Figure 2-2. M151 1/4-Ton Truck with TOW Launcher

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 130 knots.

LOAD DESCRIPTION

- Truck, GM equipment, TOW, M151A2, LIN X45549.
- Weight: 2,880 pounds.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

- Procedures are the same as for the M151 1/4-ton truck (Figure 2-1), except that special padding of the launcher optics is required. The optics cover must be secured with nylon cord and one sheet of felt pad (30- x 36-inch) secured on top of the optics. Caution the pilot to position the helicopter to the side of the load when releasing the apex fitting to prevent damage to the load.
- If the truck is reconfigured with the fuel container and the spare tire on the front fenders, secure these items on the rear of the truck in their normal position before external air transport.

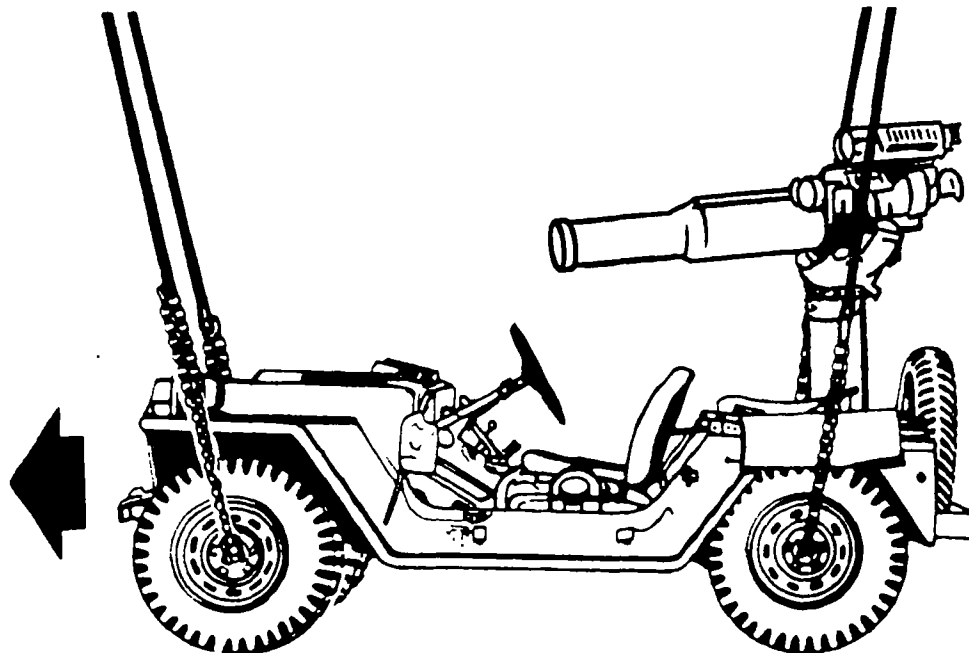


Figure 2-3. M966/M1036/M1045/M1046 TOW Missile Carrier (HMMWV) M1025/M1026/M1043/M1044 Armament Carrier (HMMWV)

APPLICABILITY

These vehicles are certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 130 knots, with and without pendant. These vehicles are also certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 130 knots.

LOAD DESCRIPTION

- TOW missile carrier (HMMWV); M966, LIN T05096; M1036; M1045; TAMCN D1125; M1046, TAMCN D1125.
- Armament carrier (HMMWV); M1025, LIN T92242; M1026, LIN T92310; M1043, TAMCN D1159; M1044, TAMCN D1159.
- Weight: Empty and loaded weight is dependent on model configuration.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity) (CH-47D only).
- Multi-leg sling set (15,000-pound capacity) two each or
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity) (CH-53E only).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pounds breaking strength.

PERSONNEL

Two persons can prepare and rig the load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Fold mirrors forward in front of the windshield for added protection and tie together with nylon cord.
- Secure all loose equipment and cargo inside the vehicle with tape, nylon cord, or lashings. Remove antennas and stow inside vehicle.
- Make sure that the vehicle fuel tank is not over 3/4 full. Inspect fuel tank cap, oil filler cap, and battery caps for proper installation.

- Engage the vehicle parking brake and put the transmission in neutral.
- Ensure the front wheels are pointed straight ahead. Tie down the steering wheel using the securing device attached under the dashboard.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1.
 - Loop the chain end of the left and right sling legs through their respective lift provisions that protrude through the hood and insert link 80 (25 for the 15,000-pound multi-leg sling set) or (30 for the 40,000-pound sling set) in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on the vehicle roof.
 - Loop the chain end of the left and right sling legs through their respective eyelet openings in the upper corner of the tailgate. Loop the chain end through the lift shackle on the rear bumper and thread back through the eyelet opening in the tailgate. Insert link 45 (3 for the 15,000-pound multi-leg sling set or 9 for the 40,000-pound sling set) in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The hookup team stands on the roof. The static discharge person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the vehicle and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

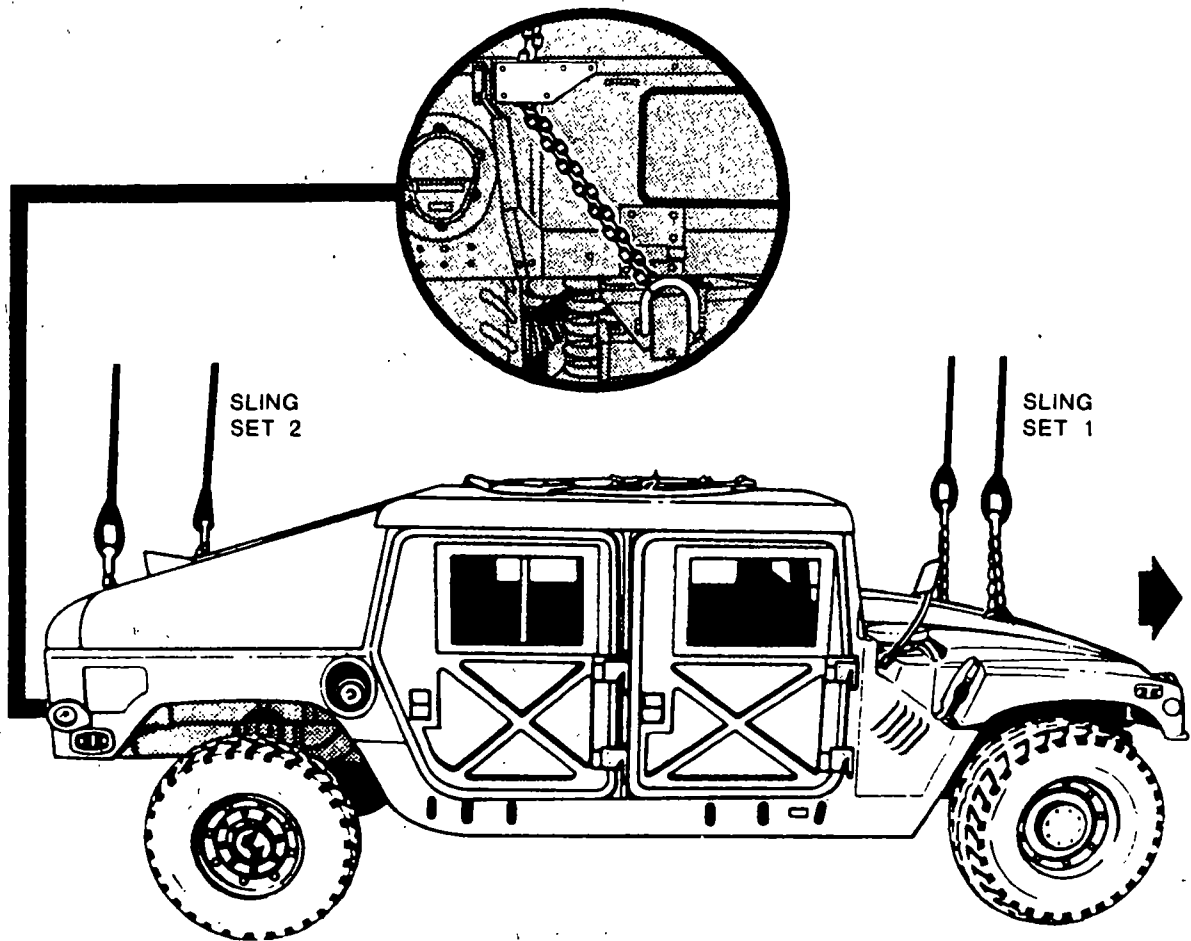


Figure 2-4. M996 Truck, Ambulance (HMMWV) M997 Truck, Ambulance (HMMWV)

APPLICABILITY

The M996 and M997 ambulances are certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 130 knots.

LOAD DESCRIPTION

- Truck, ambulance, M996, HMMWV, LIN T38707.
- Weight:
 - Empty, 6,700 pounds.
 - Loaded, 7,400 pounds.
- Truck, ambulance, M997, HMMWV, LIN T38844.
- Weight:
 - Empty, 7,000 pounds.
 - Loaded, 7,400 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Spreader bar assembly (component of vehicle)

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Fold mirrors forward in front of the windshield and tie together using nylon cord.
- Remove the spreader bar from under the right-hand seat inside the ambulance.
- Secure all equipment inside the rear compartment with tape, nylon cord, and/or lashings. Close and secure the doors.

- Secure all other equipment inside the vehicle with tape, nylon cord, and/or lashings. Close and secure the doors.
- Make sure the fuel tank is not over 3/4 full. Inspect fuel tank cap, oil filler cap, and battery caps for proper installation.
- Engage the vehicle parking brake. Place the transmission in neutral.
- Make sure that the front wheels are pointed straight ahead. Tie down the steering wheel using the securing device attached under the dashboard.
- Secure the Red Cross insignia covers in the closed position.
- Remove the keeper from the spreader bar and extend the bar to the mark. Reinstall pin and engage keeper. Use the sighting hole in the tube to assist in aligning holes for the pin.
- Position the spreader bar across the rear end of the vehicle roof. Attach the spreader bar check cables to the eyebolts located on the aft exterior sidewall of the rear compartment.
- Install the lift provisions on the outer ends of the rear bumper by removing the tie-down provisions located inboard of the bumper ends and installing them on the outer ends of the rear bumper, if necessary.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the hood.
 - Loop the chain end of the left and right sling legs through their respective lift provisions that protrude through the hood, and insert link 80 in the grabhook.
- Aft sling set (2 sling legs)
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting on top of the rear compartment. Place the nylon rope in the guides on the ends of the spreader bar. Attach the spreader bar guide retainer pins and keepers. Lay the spreader bar on the roof. Make sure the sling legs are behind the check cable eyebolts.
 - The rear lift provisions are located on the outer ends of the rear bumper. Do not loop the chain end through the tie-down shackles located near the center of the rear bumper. Loop the chain end of the left and right sling legs through their respective lift provision and insert link 45 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set on top of the vehicle to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the hood and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands on the roof and places apex fitting 2 onto the aft cargo hook. The hookup

team then carefully dismounts the vehicle and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

NOTE: The M997 ambulance is illustrated. The M996 ambulance is similar.

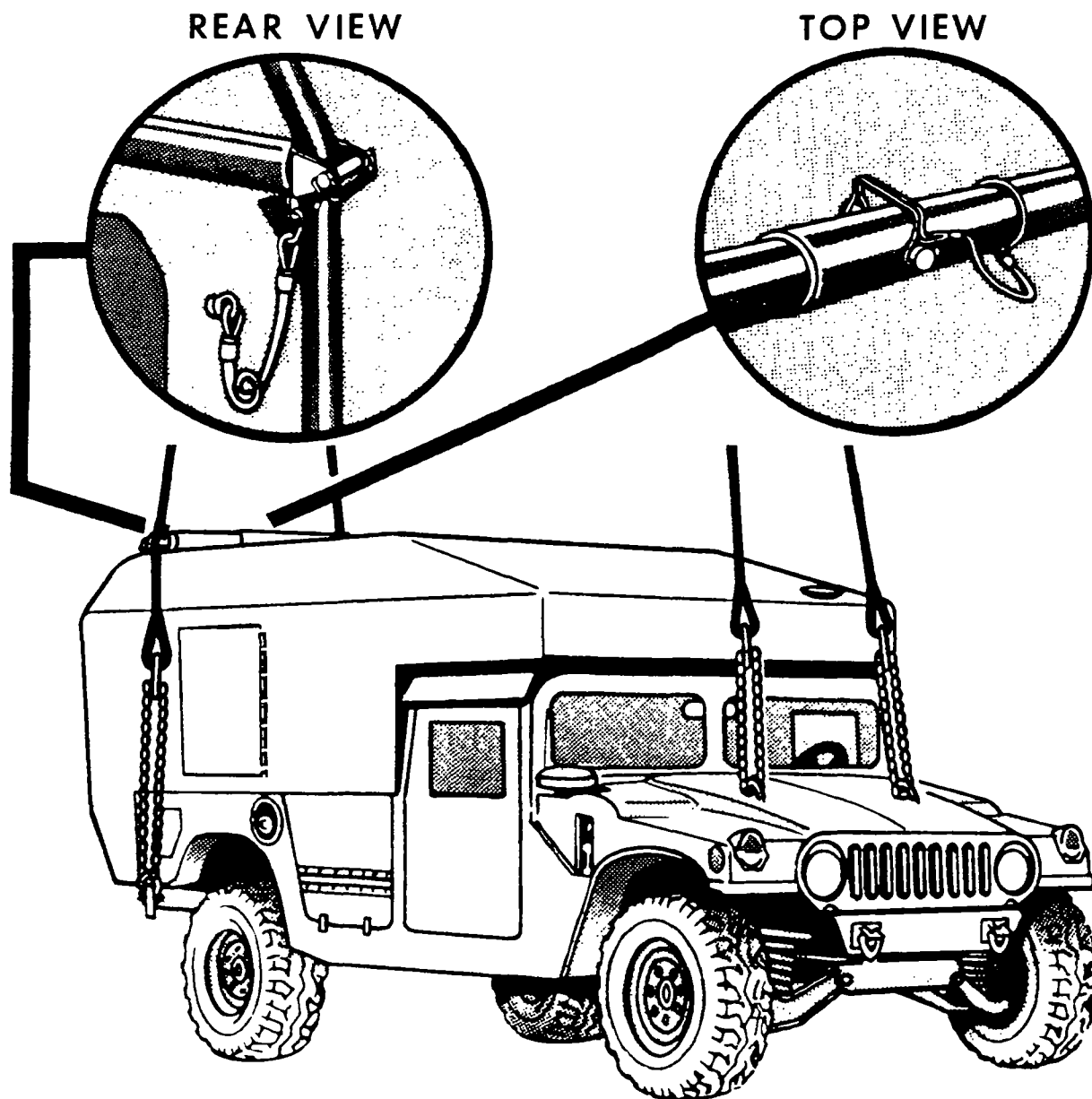


Figure 2-5. M998/M1038 Truck, Cargo, 1 1/4-Ton (HMMWV)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D and CH-53E helicopters at airspeeds up to and including 125 and 130 knots, respectively.

LOAD DESCRIPTION

- Truck, cargo, 1/4-ton, M998, LIN T61494; M1038, LIN T61562.
- Weight:
 - Empty, 5,200 pounds.
 - Loaded, 7,700 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity) (CH-47D only).
- Multi-leg sling set (15,000-pound capacity) two each or
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity) (CH-53E only).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.

PERSONNEL

Two persons can prepare and rig the load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Fold mirrors forward in front of the windshield for additional protection and tie together with nylon cord. If installed, remove canvas covering over the bed of the truck. Remove the doors. If time permits, fold canvas top and tie to windshield for added protection.
- Secure all loose equipment and cargo inside the vehicle with tape, nylon cord, or lashings.
- Make sure that the vehicle fuel tank is not over 3/4 full. Inspect fuel tank cap, oil filler cap, and battery caps for proper installation.
- Engage the vehicle parking brake and put the transmission in neutral.

- Ensure the front wheels are pointed straight ahead. Tie down the steering wheel using the securing device attached under the dashboard.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the hood.
 - Loop the chain end of the left and right sling legs through their respective lift provision that protrudes through the hood and insert link 80 (25 for the 15,000-pound multi-leg sling set or 30 for the 40,000-pound sling set) in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting number 2. Position the apex fitting on the truck bed.
 - Loop the chain end of the left and right sling legs through their respective eyelet opening in the outboard upper corner of the tailgate. Loop the chain end through the lift shackle on the rear bumper and thread back through the eyelet opening in the tailgate. Insert link 45 (3 for the 15,000-pound multi-leg sling set or 9 for the 40,000-pound sling set) in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The static wand person discharges the static electricity with the static wand. The forward hookup person stands in the driver's compartment and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands in the bed of the truck and places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the vehicle and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

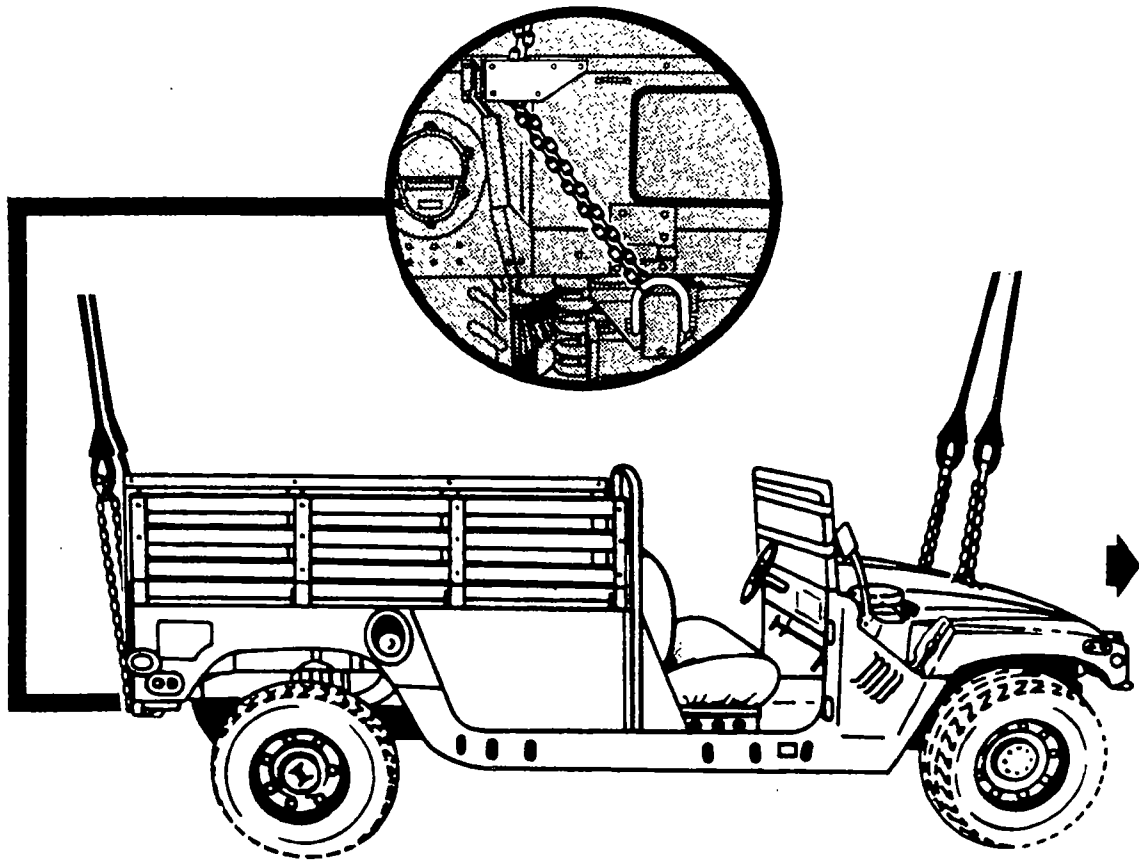


Figure 2-6. M1037 Truck, Shelter Carrier (HMMWV)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47 helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Truck, M1037, 1 1/4-ton, S250 shelter carrier (HMMWV), LIN T07543, with S250 or S250E shelter and external air lift member.
- Weight:

VARIANTS	CURB WEIGHT (pounds)	MAXIMUM EAT WEIGHT (pounds)
NC Operations	8,263	8,800
NC Switch	8,248	8,513
NC LOS (V3)	8,099	8,611
NC Management	7,737	8,800
NC Support Vehicle	8,227	8,400
LEN Operations	8,412	8,800
LEN Switch	8,328	8,800
LEN LOS (V4)	7,894	8,800
LEN Management	8,100	8,800
LEN Cable Vehicle	8,148	8,180
SCC Command	8,346	8,800
SCC Planning	7,815	8,300
SCC Technical	8,237	8,507
LOS (V1)	8,106	8,800
LOS (V2)	7,687	8,500
Radio Access Unit	8,410	8,800
SEN (V1)	8,059	8,800
SEN (V2)	8,181	8,800
Maintenance 1	8,049	8,084
Maintenance 2	7,905	8,350
Battalion Spares	8,232	8,800
Company Spares	7,837	7,850

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.

- Cord, nylon, Type III, 550-pound breaking strength.
- Cotton webbing, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Fold mirrors forward in front of the windshield for added protection and tie together using nylon cord.
- Ensure that the shelter is secured to the truck using wire rope or tie-down assemblies. Secure all equipment inside the shelter with tape, nylon cord, and/or lashings. Secure the door in the closed position.
- Secure all other equipment inside the vehicle with tape, nylon cord, or lashings.
- Make sure the fuel tank is not over 3/4 full. Inspect the fuel tank cap, oil filler cap, and battery caps for proper installation.
- Engage the vehicle parking brake and put the transmission in neutral.
- Ensure that the front wheels are pointed straight ahead. Tie down the steering wheel using the securing device attached under the dashboard.
- Install the lift provisions on the outer ends of the rear bumper by removing the tie-down provisions located inboard of the bumper ends and installing them on the outer ends of the rear bumper, if necessary.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting (number 1). Position the apex fitting on top of the hood.
 - Loop the chain end of the left and right sling legs through their respective lift provisions that protrude through the hood and insert link 80 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the shelter.
 - The rear lift provisions are located on the outer ends of the rear bumper. Do not loop the chain through the tie-down shackles located near the center of the rear bumper. Loop the chain end of the left and right sling legs through their respective lift provisions and insert link 45 in the grabhook.
- Secure excess chain with tape or nylon cord.

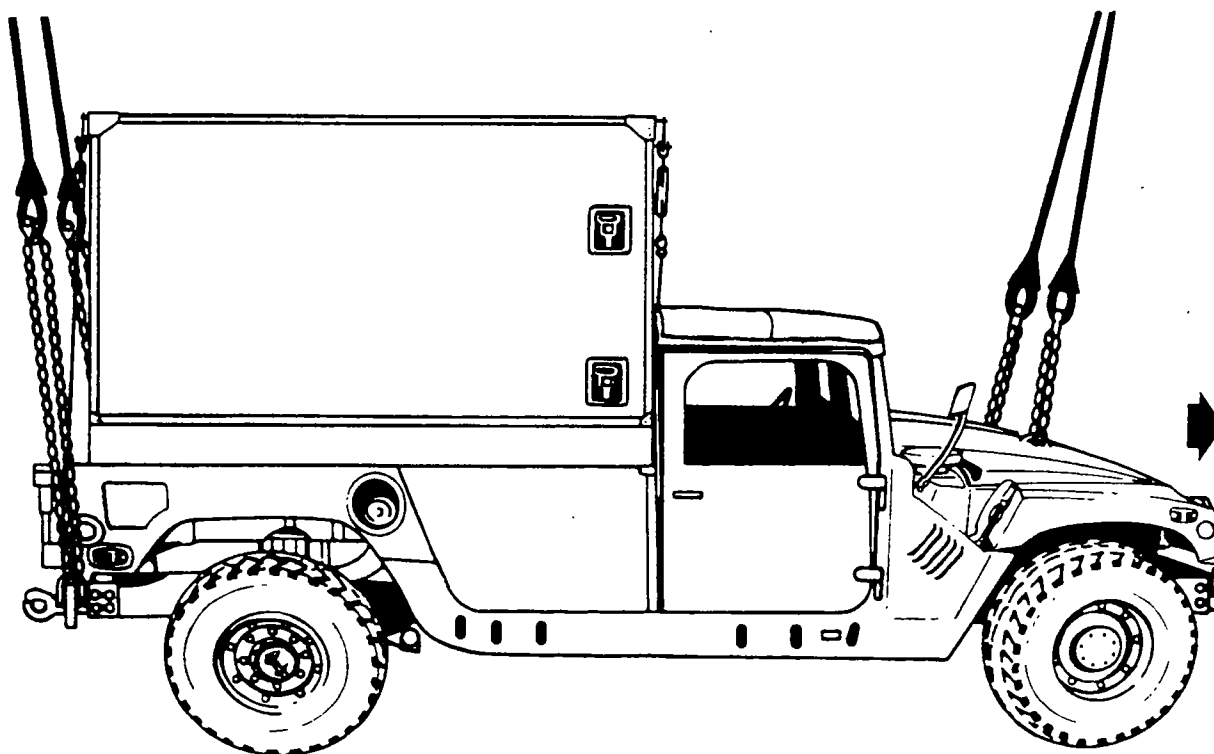
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together on top of the shelter to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The hookup team stands on top of the shelter. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook, and the aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the shelter and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-6.1. M1037 High Mobility Multipurpose Wheeled Vehicle (HMMWV) Modified (9,400 Pound GVW)**

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 125 knots.

LOAD DESCRIPTION

- Truck cargo/troop carrier, high mobility multipurpose wheeled vehicle (HMMWV), M1037 modified, 9,400 pound GVW.

WARNING

This cargo vehicle (M1037 modified, 9,400 pound GVW) should not be confused with the shelter carrier (M1037, 8,600 pound GVW). The M1037 modified has improved lift provisions which allow it to be lifted at higher GVW.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Fold mirrors forward in front of the windshield and tie together with nylon cord.
- Secure all equipment and cargo inside the vehicle with tape, nylon cord, or lashings.
- Ensure that the fuel tank is not over 3/4 full. Inspect the fuel tank cap, oil filler cap, and battery cap for proper installation.
- Engage the vehicle parking brake and put the transmission in neutral.
- Ensure that the front tires are pointed straight ahead. Tie down the steering wheel using the securing device attached under the dashboard.

Step 2. Rigging

- **Forward sling set (2 sling legs):**
 - Connect two sling legs to apex fitting (number 1). Position the apex fitting on top of the hood.
 - Loop the chain end of both sling legs through their respective lift provision located on the hood and insert link 80 in the grabhook.
- **Aft sling set (2 sling legs):**
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the truck bed.
 - Loop the chain end of both sling legs through their respective eyelet opening in the upper corner of the tailgate. Loop the chain end through the lift shackle on the rear bumper and thread back through the eyelet opening in the tailgate. Insert link 25 in the grabhook.
- **Secure excess chain with tape or nylon cord.**
- **Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the hood to prevent entanglement during hookup and lift-off.**

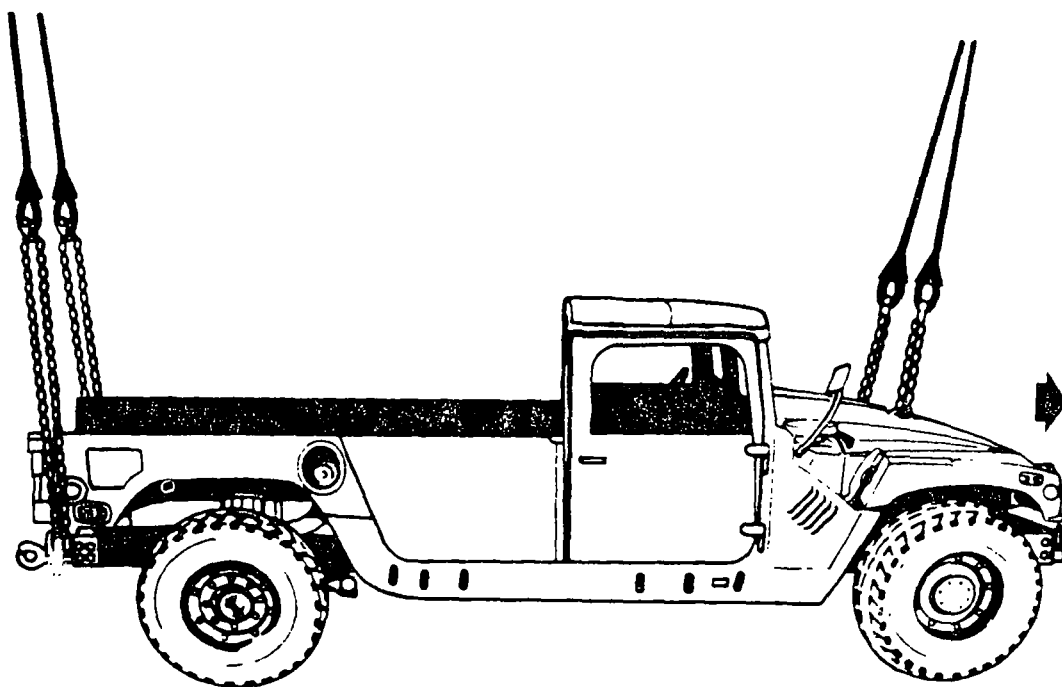
Step 3. Hookup

NOTE: Connect the apex fitting to the cargo hooks so the vehicle hood is forward.

The static wand person discharges the static electricity with the static wand. The forward hookup person stands in the driver's compartment and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands in the bed of the truck and places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-6.2. Light Armored Vehicle (LAV) (USMC)**

APPLICABILITY

The following loads are certified by the US Army NRDEC for CH-53E helicopters at airspeeds denoted below.

LOAD DESCRIPTION

- Light armored vehicle, command and control, TAMCN E0946:
 - Weight: 27,060 pounds.
 - Airspeed: 135 knots.
- Light armored vehicle, logistics, TAMCN E0948:
 - Weight: 28,200 pounds.
 - Airspeed: 135 knots.
- Light armored vehicle, recovery unit, TAMCN E0950:
 - Weight: 23,400 pounds.
 - Airspeed: 135 knots.
- Light armored vehicle, TOW antitank, TAMCN E0942:
 - Weight: 27,650 pounds.
 - Airspeed: 130 knots.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt, or suitable substitute.

PERSONNEL

Two persons can prepare and rig these loads in 15 minutes.

PROCEDURES

Step 1. Preparation

- Secure loose items inside.
- Remove all antennae.
- Set parking brake.
- Tie any externally carried items in place with cord.
- Pad and tape/tie all vision blocks, mirrors, and lights.
- Secure all hatches and panels.
- Ensure boom is pinned down. (Recovery Unit Only.)
- Tape outside hydraulic cables. (Recovery Unit Only.)

Step 2. Rigging

VEHICLE	FORWARD	TYPE OF SLING SET	FRONT LEGS		AFT LEGS	
			1	2	3	4
Command and Control	Nose	40,000 pound	3	3	45	45
Logistics	Nose	40,000 pound	3	3	45	45
Recovery Unit	Nose	40,000 pound	3	3	50	50
Tow Antitank	Nose	40,000 pound	3	3	30	30

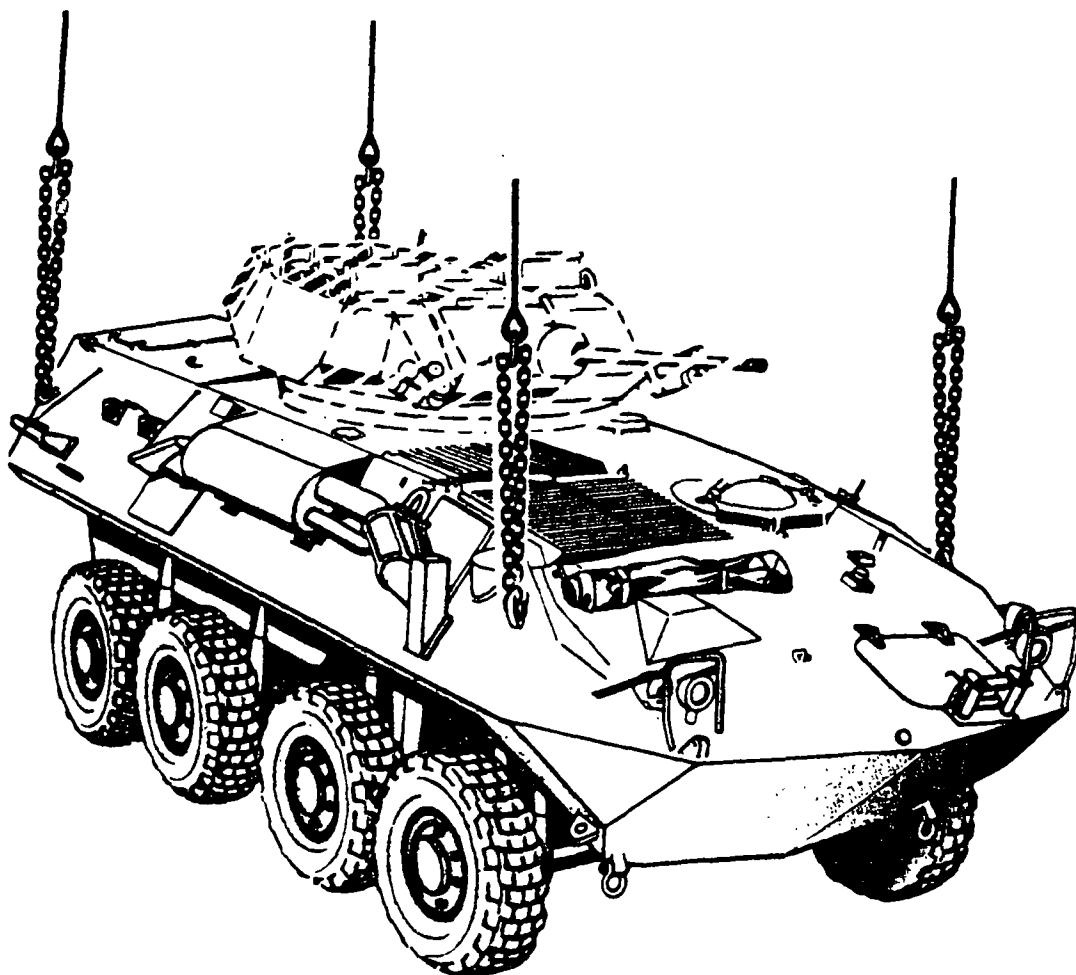
- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting (number 1). Position the apex fitting on top of the LAV.
 - Loop the chain end of the left and right sling legs through their respective lift provision and insert link identified in the chart in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting on top of the LAV.
 - Loop the chain end of the left and right sling legs through their respective lift provision and insert link identified in the chart in the grab link.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the LAV to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The hookup team stands on the LAV facing aft. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the LAV and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-6.3. M998, Truck, Utility, 1 1/4-Ton (HMMWV)**

APPLICABILITY

This load, in the empty and loaded configuration, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 100 and 110 knots, respectively.

LOAD DESCRIPTION

- Truck, utility, 1 1/4-ton (HMMWV), M998, LIN T61491; M1038, LIN T61562.
- Trailer, cargo, 3/4-ton, M101A1, LIN W95537, NSN 2330-00-898-6779; M101A2, LIN W95537, NSN 2330-01-102-4697.
- Weight:
 - Truck, empty, 5,200 to 5,327 pounds; loaded, 7,700 pounds.
 - Trailer, empty, 1,280 pounds; loaded, 2,780 pounds.
 - Total maximum weight, 10,480 pounds.
- MATERIALS
- Sling set (10,000-pound capacity) (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (5,000-pound capacity) as required.
- Pendant adapter assembly, part number 1670EG093-1, NSN 1670-00-574-8049, component of aerial recovery kit (2 each) (optional equipment).

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Position the truck and trailer on a flat, level surface. Make sure that the trailer is straight in line behind the truck.
- Attach the trailer to the truck by placing the trailer lunette on the truck pintle hook and securing the latch. Secure the safety chains between the truck and trailer.
- Secure the trailer to the truck to prevent them from pivoting in flight. Route the hook end of the CGU-1/B tie-down strap around the drawbar to the chassis connecting hinge and

around the truck frame support to which the rear lifting provisions are attached. Connect the hook end of the strap to the hook on the tie-down ratchet.

- Repeat the previous procedure using the other tie-down strap on the other side of the truck and trailer.
- Tighten both straps equally to prevent the truck and trailer from pivoting in flight. Secure the ratchet handles with tape or nylon cord.

NOTE: An optional method to secure the trailer and truck uses Type V platform clevises. Attach a clevis to both of the trailer drawbars to the chassis hinges and the truck tie-down provisions located on the outboard side of the truck frame above the rear wheels. Route the hook end of one of the tie-down straps through the clevises on one side of the load. Repeat with the other strap on the other side of the load. Secure the ratchet handles with tape or nylon cord.

- Fold the truck mirrors forward in front of the windshield for added protection and tie together with nylon cord. If installed, remove canvas covering over the bed of the truck. Remove the doors. If time permits, fold canvas top and tie to windshield for added protection.
- Secure all loose equipment, cargo, and antennae inside the truck with tape, lashing, or nylon cord.
- Ensure that the fuel tank is not over 3/4 full. Inspect fuel tank cap, oil filler cap, and battery caps for proper installation.
- Ensure that the truck front wheels are pointing straight forward. Tie down the steering wheel using the securing device attached under the dash.
- Engage the truck parking brake. Place the transmission in neutral.
- Secure all equipment and cargo inside the trailer with tape, lashings, or nylon cord.
- Open the trailer tailgate left and right racks and secure to their respective side racks. Fasten the tailgate in the open position with the chains on each side hooked through the keeper.
- Remove the trailer cover. Stow and secure in place in the trailer or place in another location where it will not be lost in flight. Transporting a trailer with the cover installed increases the risk of the cover blowing loose during flight causing damage to the load and possibly tangling in the helicopter rotor blades.
- Engage the trailer parking brakes.
- Secure the intravehicular cable to the trailer chassis frame with tape or nylon cord.

Step 2. Rigging

NOTE: When using the optional pendant, connect the sling set apex fitting to the pendant lower loop. When hooking up the load to the helicopter, connect the upper loop to the cargo hook.

- **Truck:**

- Position the apex fitting on top of the truck cargo compartment. Route outer sling legs 1 and 2 to the front of the truck and inner sling legs 3 and 4 to the rear. Sling legs 1 and 3 must be on the left side of the truck.
- Loop the chain end of sling leg 1 through the left front lift provision that protrudes through the hood and insert link 76 in the grabhook. Repeat with sling leg 2 and the right front lift provision.
- Route the chain end of sling leg 3 through the eyelet opening in the upper left corner of the tailgate, through the left lifting shackle on the rear bumper, and thread back through the eyelet opening in the tailgate. Insert link 3 in the grabhook. Repeat with sling leg 4 on the right rear lifting shackle.
- Secure excess chain with tape or nylon cord.
- Raise the apex fitting above the truck. Make sure the rear sling legs are kept to the rear of the truck. Cluster and tie or tape (breakaway technique) all sling legs together on top of the truck to prevent entanglement during hookup and lift-off.

- **Trailer:**

- Position the apex fitting on top of the trailer. Route outer sling legs 1 and 2 to the front of the trailer. Route inner sling legs 3 and 4 to the rear of the trailer through the opening between the tailgate and the trailer bed. Sling legs 1 and 3 must be on the left side of the trailer.
- Loop the chain end of sling leg 1 through the lift provision located on the left front corner of the trailer and insert link 59 in the grabhook. Repeat with sling leg 2 and the right front lift provision.
- Route the chain end of sling leg 3 through the left rear lifting provision and insert link 36 in the grabhook. Repeat with sling leg 4 on the right rear lifting provision.
- Secure excess chain with tape or nylon cord.
- Lift sling leg 3 and tie or tape (breakaway technique) the grabhook or sling leg eyelet to the side rack so the chain does not become slack and bind in the opening between the tailgate and trailer bed. Repeat with sling leg 4 on the other side rack.
- Cluster and tie or tape (breakaway technique) all sling legs together on top of the trailer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: A static wand person is not required when the optional pendant is used to connect the load to the cargo hook.

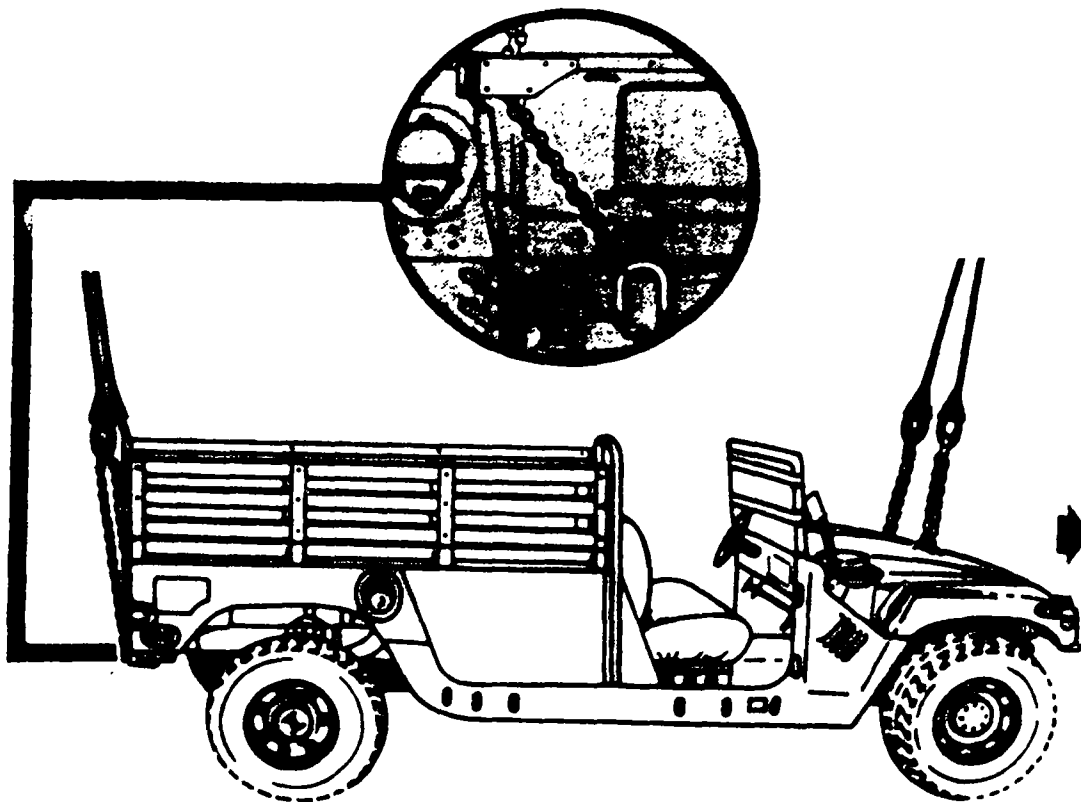
- **Truck:**

- The hookup team stands in the bed of the truck. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting onto the forward cargo hook.

- Trailer:
 - The hookup team stands in the trailer cargo compartment. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting onto the aft cargo hook.
- The hookup team then carefully dismounts each load and remains close to the load as the helicopter removes slack in the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-6.4. M35A2 Truck, 2 1/2-Ton Modified, Part of AN/MPQ-49A Forward Area Alerting Radar (FAAR) System**

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 130 knots.

LOAD DESCRIPTION

- Truck, modified M35A2, 2 1/2-ton capacity.
- Weight: 10,900 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (5,000-pound capacity).

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Remove upper portion of exhaust stack and secure inside cab.
- Remove cab top canvas, lower windshield, fold the canvas over the windshield and secure with nylon cord.
- Secure the windshield in the down position with tie-down straps.
- Safety-tie the hood closed with nylon cord around the hood latch.
- Make sure fuel cap is secure and that oil filler, radiator, and battery caps are properly installed. Make sure the battery compartment door is fastened.
- Tie down seats and secure doors with nylon cord.
- Engage vehicle hand brake and place transmission in neutral.
- Straighten front wheels and secure steering wheel in place with nylon cord.

Step 2. Rigging

- Sling set number 1 (2 sling legs):
 - Connect two sling legs to apex fitting (number 1). Position the apex fitting on top of the hood.
 - Loop the chain end of both sling legs through their respective lift provision located on the front bumper and insert link 3 in the grabhook.
- Sling set number 2 (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the truck chassis.
 - Loop the chain end of both sling legs through their respective lift provisions located on top of the spring housing between the rear wheels and insert link 3 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the truck to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings to the cargo hooks so the nose is forward.

The forward hookup person stands on the passenger's seat and the aft hookup person stands on the trailer chassis. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts and remains close to the load as the helicopter removes slack from the sling leg. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

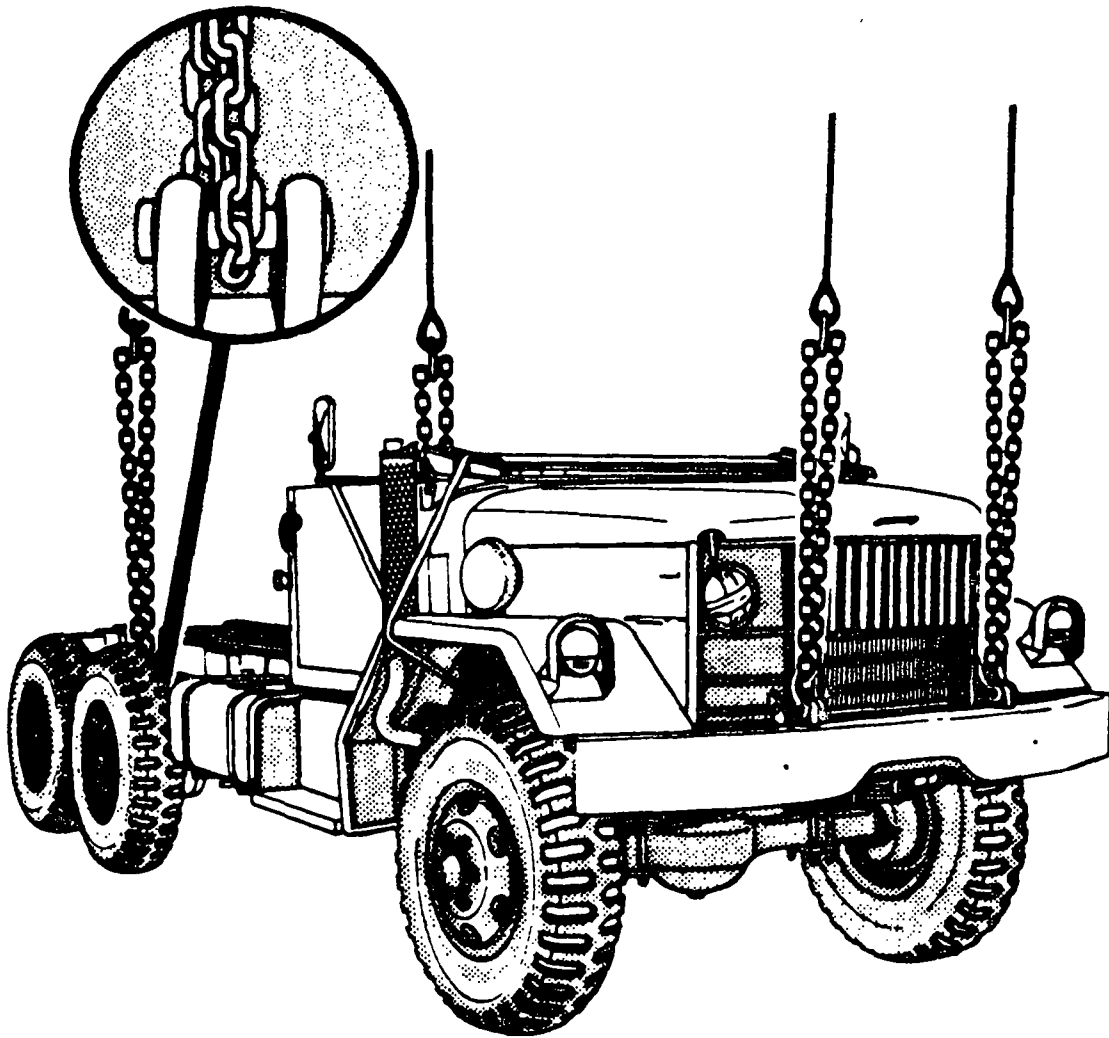




Figure 2-7. Mk48, Front Power Unit

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 110 knots.

LOAD DESCRIPTION

- Front power unit, 12 1/2-ton, Mk48, TAMCN D0209, NSN 2320-01-177-5167.
- Weight: 26,000 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Chain, 8-foot, part no. JETS-WMC-5000 (10,000-pound capacity) from a 40,000-pound sling set (2 each).
- Coupling link, part no. 577-0815 (2 each).

PERSONNEL

Four persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Make sure front wheels are pointed straight ahead. Engage parking brake. Place transmission in neutral.
- Open vent on top of cab. Secure all loose gear with tape or nylon cord. Tape over turbocharger opening and all windows.

Step 2. Rigging

NOTE: The power unit is rigged to fly sideways. The passenger side is designated the front of the load.

- Forward sling set (apex fitting number 1):
 - Connect two sling leg assemblies to apex fitting number 1.

- Position the apex fitting on top of the muffler area. Loop the chain end of the left sling leg through the lift provision just aft of the passenger side of the cab, and insert link 41 in the grab link.
- Using the coupling link, attach one additional chain assembly to the right sling leg chain. Loop the chain end of the right sling leg through the lift provision on the right rear corner aft of the spare tire. Insert link 3 in the grab link.
- Aft sling set (apex fitting number 2):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting on top of the driver's side of the engine deck. Loop the chain end of the left sling leg through the lift provision just aft of the driver's side of the cab, and insert link 41 in the grab link.
 - Using the coupling link, attach the other additional chain assembly to the right sling leg chain. Loop the chain end of the right sling leg through the lift provision on the left rear corner aft of the spare tire. Insert link 3 in the grab link.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the power unit to prevent entanglement during hookup and lift-off.

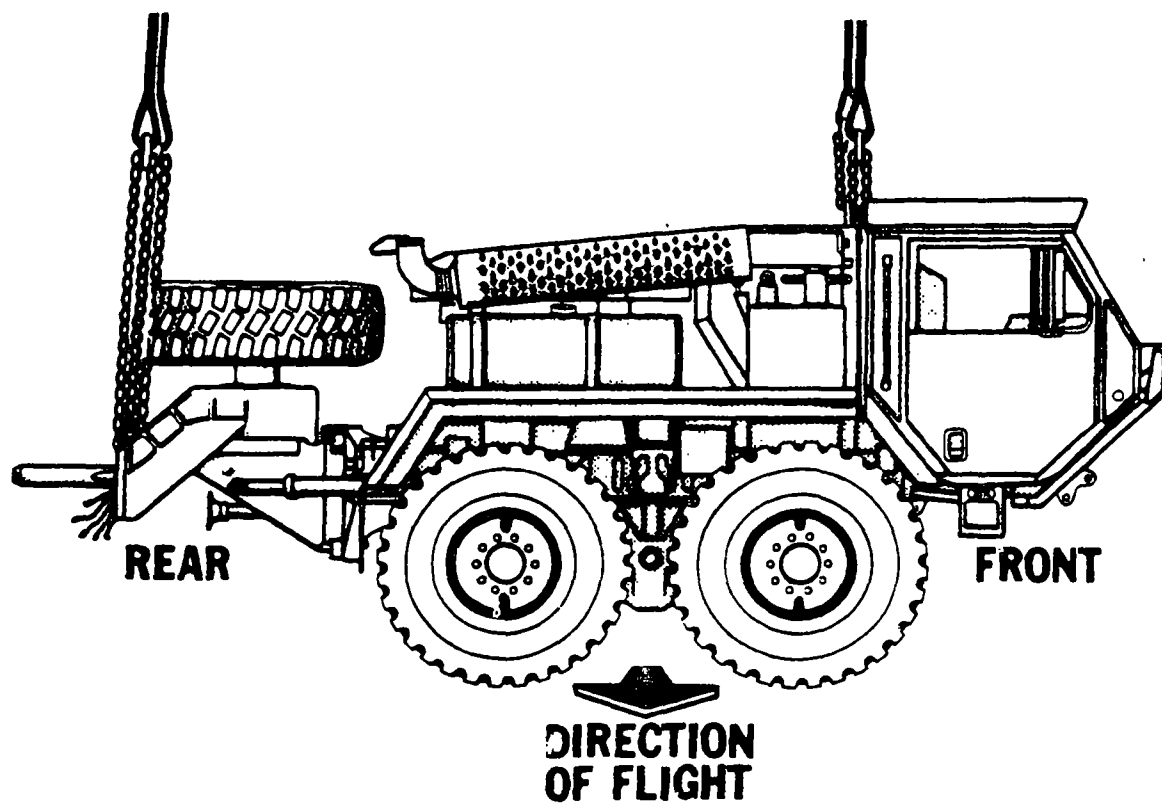
Step 3. Hookup

NOTE: The power unit is rigged to fly sideways. The apex fitting on the passenger side must be connected first to prevent the vehicle from tipping. Only one static wand person is required.

The hookup team stands on top of the engine deck. The single static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. After the passenger side apex fitting is connected, the aft hookup person places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts from the power unit and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



TRAILERS

*The certified dual-point rigging procedures for trailers are in this section. Figures 2-8 through 2-14.1 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-8. M101A2 3/4-Ton Trailer

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 100 knots.

LOAD DESCRIPTION

- M101A2 3/4-ton cargo trailer, LIN W95537.
- Weight:
 - Empty, 1,280 pounds.

WARNING

Do not transport the M101A2 trailer at gross weights of less than 1,575 pounds because it is extremely unstable and can contact the underside of the helicopter. Any M101A2 that is lighter than 1,575 pounds must have additional cargo or dummy weight placed as close to the center of the trailer bed as possible.

- Loaded:

VARIANTS	CURB WEIGHT (pounds)
Command Version 1 Trailer	1,958
Command Version 2 Trailer	1,981
LEN Cable Trailer	2,796
NC Support Trailer	2,643
Maintenance Trailer #2	1,430
Battalion Spares Trailer #1	1,594
Battalion Spares Trailer #2	2,206

WARNING

Maximum weight during EAT operations for any variant of the M101A2 is 3,000 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down, cargo, CGU-1/B (2 each or equivalent).

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Remove front rack and place in bed of the trailer. Load cargo on top of the rack.
- Fasten the tailgate in the open position with the chains on each side hooked through the keeper.
- Secure cargo in the bed of the trailer with the tie-down straps. Attach one end of a strap around the tailgate left hinge, loop strap diagonally over the load and connect the other end to the right front lifting shackle. Secure loose end of strap.
- Repeat previous step with the second strap using the tailgate right hinge and left front lifting shackle. Secure loose end of strap.
- Tape or tie the light cable firmly to the top of the drawbar.
- Engage the parking brake.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on the drawbar.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the front of the trailer and insert link 3 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Route the two sling legs through the opening between the tailgate and the trailer bed. Route each chain on the inboard side of the tailgate hinges.
 - Loop the chain end of the left and right sling legs through their respective lift provisions and insert link 21 in the grabhook. Secure excess chain with tape or nylon cord.

- Lift the rear sling legs and tape or tie the grabhook or sling leg (breakaway technique) to its respective trailer side rack so the chain will not become slack and bind in the opening between the tailgate and trailer bed.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The hookup team stands in the trailer bed. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook, and aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the trailer and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

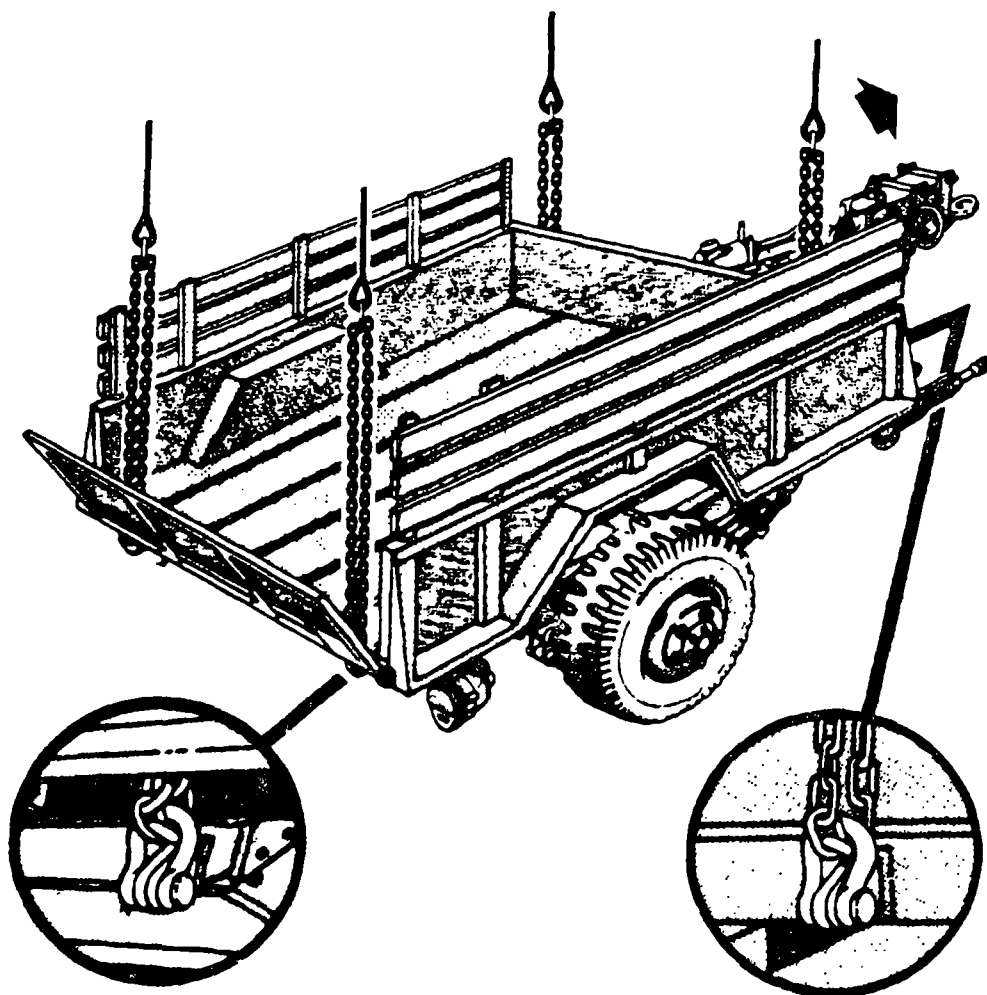


Figure 2-9. M871A1 Semitrailer

APPLICABILITY

This semitrailer, when empty, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 80 knots. This trailer cannot be transported by the CH-53E because of the front to rear weight distribution.

LOAD DESCRIPTION

- M871A1 22 1/2-ton semitrailer, LIN S70027.
- Weight: 12,240 pounds empty.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B, as required.

PERSONNEL

Two persons can prepare and rig the load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Remove any cargo from the trailer bed. This trailer cannot be transported by helicopter with any cargo in the bed.
- Level the trailer by adjusting the landing gear.
- Remove the sideboards and tailgate panels and secure them to the front of the trailer in their standard storage location according to TM 9-2330-358-14&P. Use tie-down straps or equivalent to secure the panels to trailer. Make sure the panels are securely lashed so they will not come free during transport.
- Secure compartment doors with tape or nylon cord.
- Secure the spare tire in its storage compartment with nylon cord to prevent movement during flight.
- At each lifting provision location, pull down on the latch and push out on the bolt at the inboard end of each lifting eye. Slide the lifting eye out from the housing as far as it will go. Do not lift the semitrailer unless each lifting eye is fully extended.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of kingpin end of the trailer.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located outboard from the landing gear and insert link 30 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting number 2. Position the apex fitting on top of the wheel end of the trailer.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located aft of the rear wheel and insert link 3 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together on top of the trailer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings so the trailer is carried wheel end forward.

The hookup team stands on the trailer. The static wand person discharges the static electricity with the static wand. One hookup person (kingpin end) places apex fitting number 1 onto the aft cargo hook. The other hookup person (wheel end) places apex fitting number 2 onto the forward cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the trailer and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

- Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

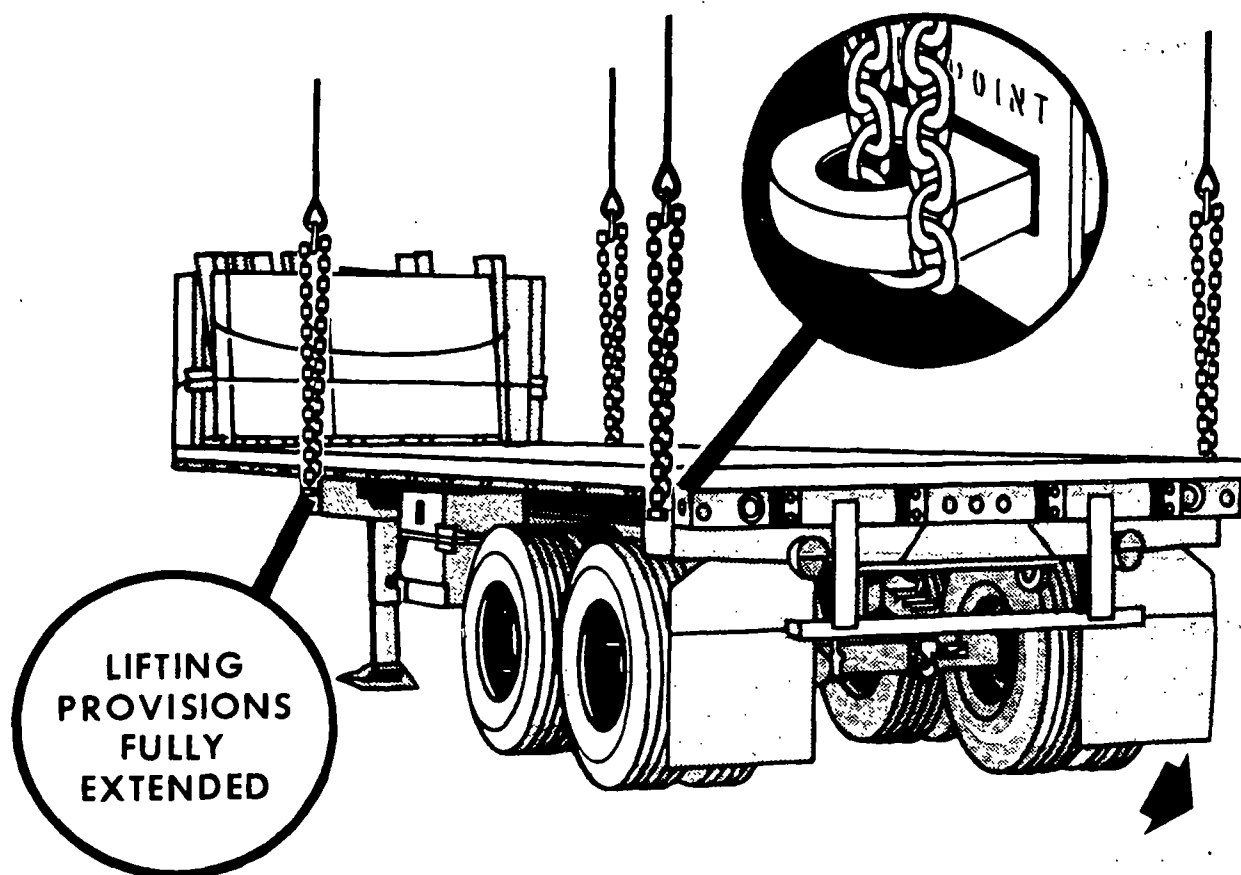


Figure 2-10. M989 Heavy-Expanded Mobility Ammunition Trailer

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 130 knots.

LOAD DESCRIPTION

- M989 heavy-expanded mobility ammunition trailer (HEMAT), LIN T45465, NSN 2330-01-109-4258.
- Weight: 7,640 pounds empty (this load is certified at the empty weight only).

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down, cargo, CGU-1/B (4 each or equivalent).

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- At each corner of the trailer, slide the lifting provisions out until they are completely extended. Do not lift the trailer unless the provisions are fully extended and secured in position.
- Remove the side and end panels. Place two panels side by side on the trailer so that the panel ends are approximately 10 inches from the front of the trailer. Make sure the panels are positioned lengthwise on the trailer. Place the remaining panels on top of the respective panels on the trailer.
- Secure the panels on the trailer with the tie-down straps. Attach the hook end of one tie-down strap to a tie-down ring on the trailer bed beside the panels approximately 1 foot from the end of the panels. Connect and tighten the ratchet end to a tie-down ring on the other side of the panels. Secure loose end of strap. Repeat with a second tie-down strap at the other end of the panels.
- To secure the panels lengthwise, route the hook end of one tie-down strap around the vertical metal stiffeners on the top panel of the stack of panels on the left side of the trailer. Attach the hook end to a tie-down ring on the front end of the trailer bed. Connect

and tighten the ratchet end to a tie-down ring on the other end of the stack of panels. Secure loose end of strap. Repeat with a second tie-down strap on the other stack of panels.

- Tape or tie the intervehicular cable, hoses, and safety chains firmly to the top of the drawbar with tape or nylon cord.
- Engage the parking brake.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the front (tongue) end of the trailer.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the corners of the trailer and insert link 40 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting number 2. Position the apex fitting on top of the aft end of the trailer.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the corners of the trailer and insert link 4 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together on top of the trailer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings so the trailer is carried tongue end aft.

NOTE: Brief the pilot to relax sling leg tension and hover to the side of the trailer when releasing the apex fitting to prevent damage to the panels on top of the trailer.

The hookup team stands on the trailer. The static wand person discharges the static electricity with the static wand. One hookup person (tongue end) places apex fitting 1 onto the aft cargo hook. The other hookup person places apex fitting 2 onto the forward cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the trailer and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

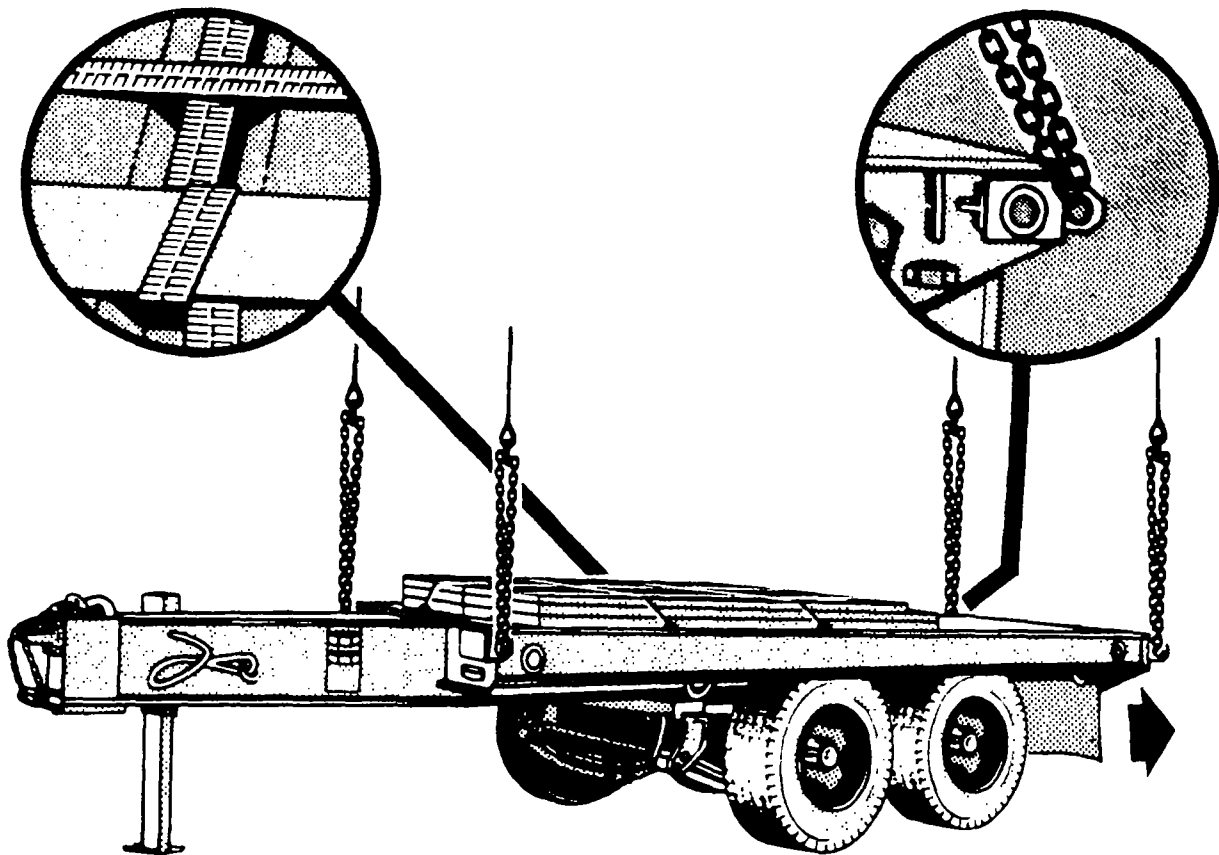


Figure 2-11. Mk14 Trailer, Container Hauler

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Trailer, container hauler, Mk14, TAMCN D0876, NSN 2320-01-176-0469.
- Weight: 16,000 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Disengage the Mk14 from the Mk48 prime mover according to the operator's manual.
- Secure all hoses with tape or nylon cord.
- Tape all lights, reflectors, and glass fixtures.
- Make sure all tool compartment doors are secured.
- Open the four access doors on top of the trailer bed. Remove the safety retainer pins from the lift provisions (eyebolts). Unscrew the eyebolts from their stored positions, and reinsert the eyebolts so that the eyes are accessible from the top of the access holes. Screw the provisions in tight and then loosen one full turn. Reinsert the safety retainer pin to prevent the provisions from backing out in flight.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1.

- Position the apex fitting on top of the forward end of the trailer. Loop the chain end of the left and right sling legs through their respective lift provisions in the bed of the trailer, and insert link 3 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting on top of the aft end of the trailer. Loop the chain end of the left and right sling legs through their respective lift provisions in the bed of the trailer, and insert link 15 in the grab link. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the trailer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the forward end of the trailer. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the aft end of the trailer. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the trailer and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

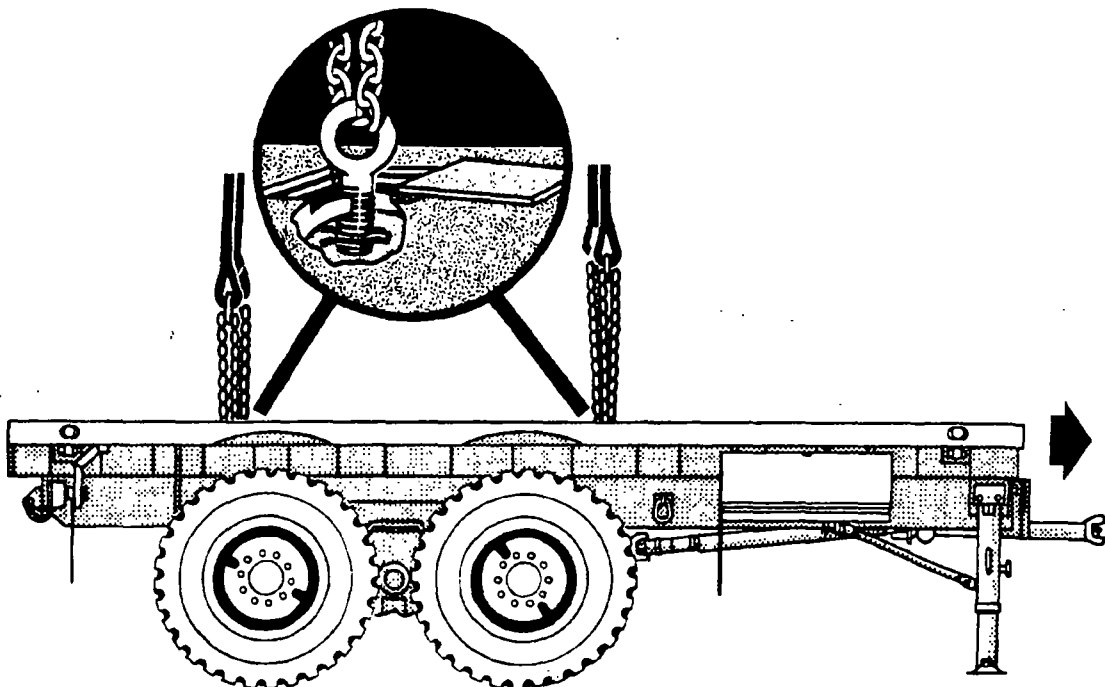


Figure 2-12. Mk15 Trailer, Wrecker/Recovery

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Trailer, powered, wrecker/recovery, Mk15, TAMCN D0877, NSN 2320-01-176-7928.
- Weight: 26,000 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (5,000-pound capacity), as required.

PERSONNEL

Two persons can prepare and rig this load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Disengage the Mk15 from the Mk48 primary mover according to the operator's manual.
- Remove the A-frame from rear of the trailer. Stow in trailer bed and secure with tie-down straps or nylon rope/webbing.
- Secure all hoses with tape or nylon cord.
- Tape all lights, reflectors, and glass fixtures.
- The two forward lift provisions (eyebolts) are stored in the tool compartment. Open the access doors located aft of the front storage compartment. Insert the eyebolts so that the eyes are accessible from the top of the access holes. Screw the provisions in tight and then loosen one full turn. Insert the safety retainer pin to prevent the provisions from backing out in flight.
- Make sure all tool compartment doors are secured.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1.
 - Position the apex fitting on top of the trailer bed behind the stowage compartment. Loop the chain end of the left and right sling legs through their respective lift provisions located in the bed behind the stowage compartment and insert link 3 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting behind the trailer. Loop the chain end of the left and right sling legs through their respective lift provisions located on the rear of the trailer on each side of the towing pintle hook and insert link 10 in the grab link. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the trailer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the front end of the trailer. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the rear end of the trailer. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the trailer and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

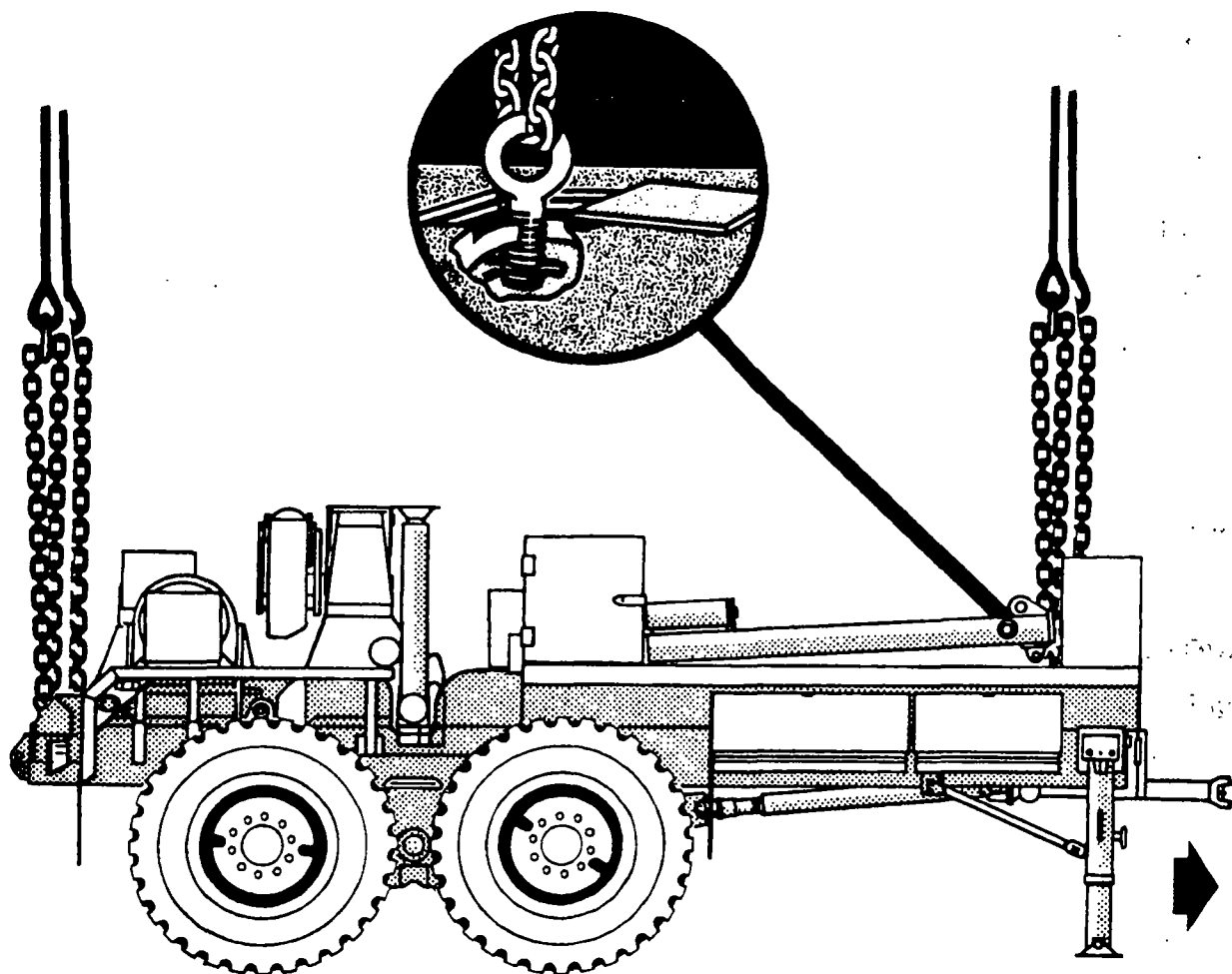


Figure 2-13. MK16 Trailer, Fifth-Wheel Adapter

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Trailer, fifth wheel semitrailer adapter, Mk16, TAMCN D0878, NSN 2320-01-176-0467.
- Weight: 16,000 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Disengage the Mk16 from the Mk48 prime mover according to the operator's manual.
- Secure all hoses and loose equipment with tape or nylon cord.
- Tape all lights, reflectors, and glass fixtures.
- Make sure all tool compartment doors are secured.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1.
 - Position the apex fitting on top of the winch. Loop the chain end of the left and right sling legs through their respective lift provisions located on the main frame below the winch and behind the front stowage compartments. Insert link 3 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).

- Position the apex fitting on top of the aft end of the trailer adapter. Loop the chain end of the left and right sling legs through their respective lift provisions located on each side of the towing pintle hook and insert link 3 in the grab link.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the trailer adapter to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the winch end of the trailer adapter. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands behind the fifth wheel. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount from the adapter and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

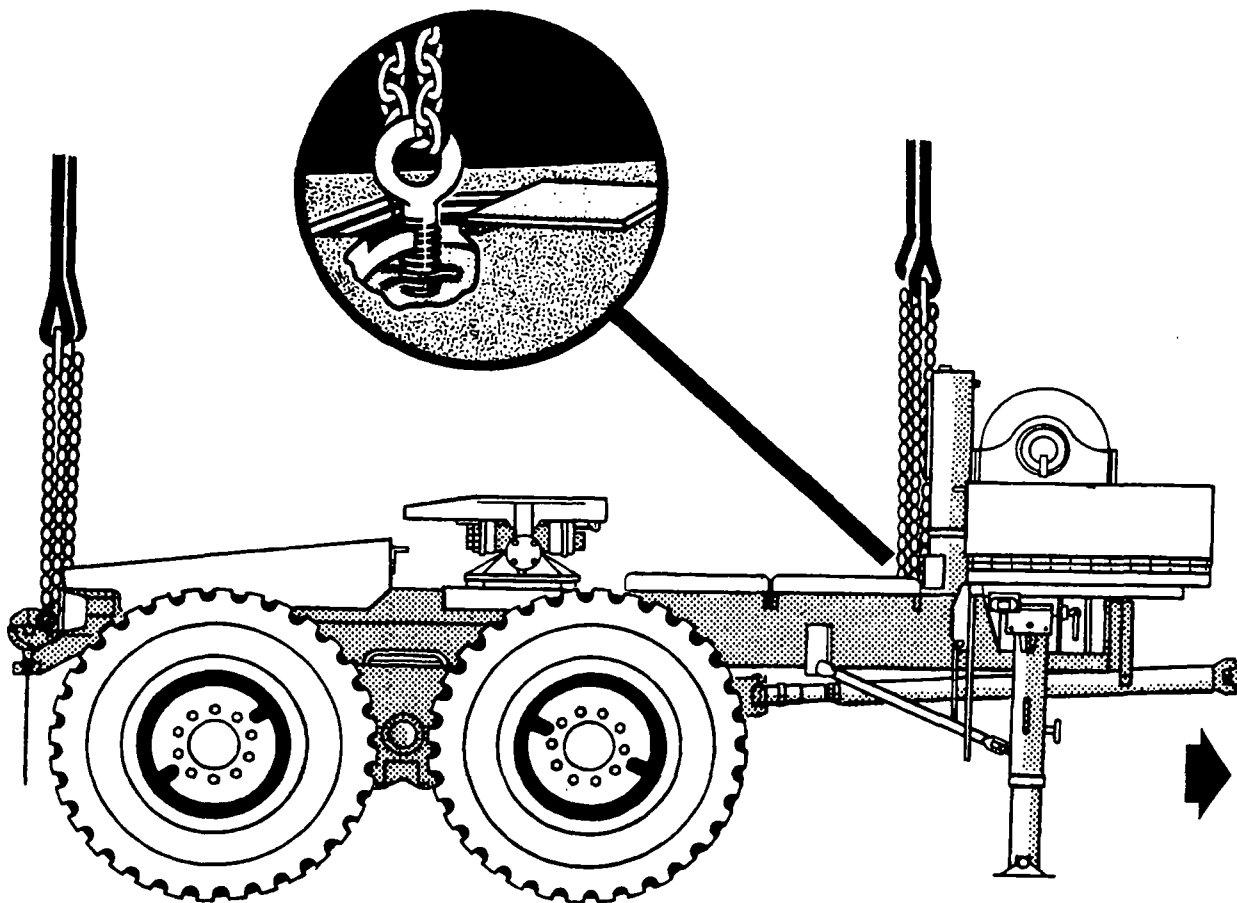


Figure 2-14. Mk17 Trailer, Drop Side, Cargo

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Trailer, drop side cargo, Mk17, TAMCN D0879, NSN 2320-01-176-0468.
- Weight: 23,000 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Disengage the Mk17 trailer from the Mk48 prime mover according to the operator's manual.
- Secure all hoses with tape or nylon cord. Tape over lights, reflectors, and glass fixtures.
- Secure all tool compartment doors with locks or nylon cord.
- Open the four access doors on top of the trailer bed. Remove the safety retainer pins from the lift provisions (eyebolts). Unscrew the eyebolts from their stored positions and reinsert the eyebolts so that the eyes are accessible from the top of the access holes. Screw the provisions in tight and then loosen one full turn. Reinsert the safety retainer pin to prevent the provisions from backing out in flight.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1.
 - Position the apex fitting on top of the front end of the trailer. Loop the chain end of the left and right sling legs through their respective lift provisions in the trailer bed and insert link 4 in the grab link.

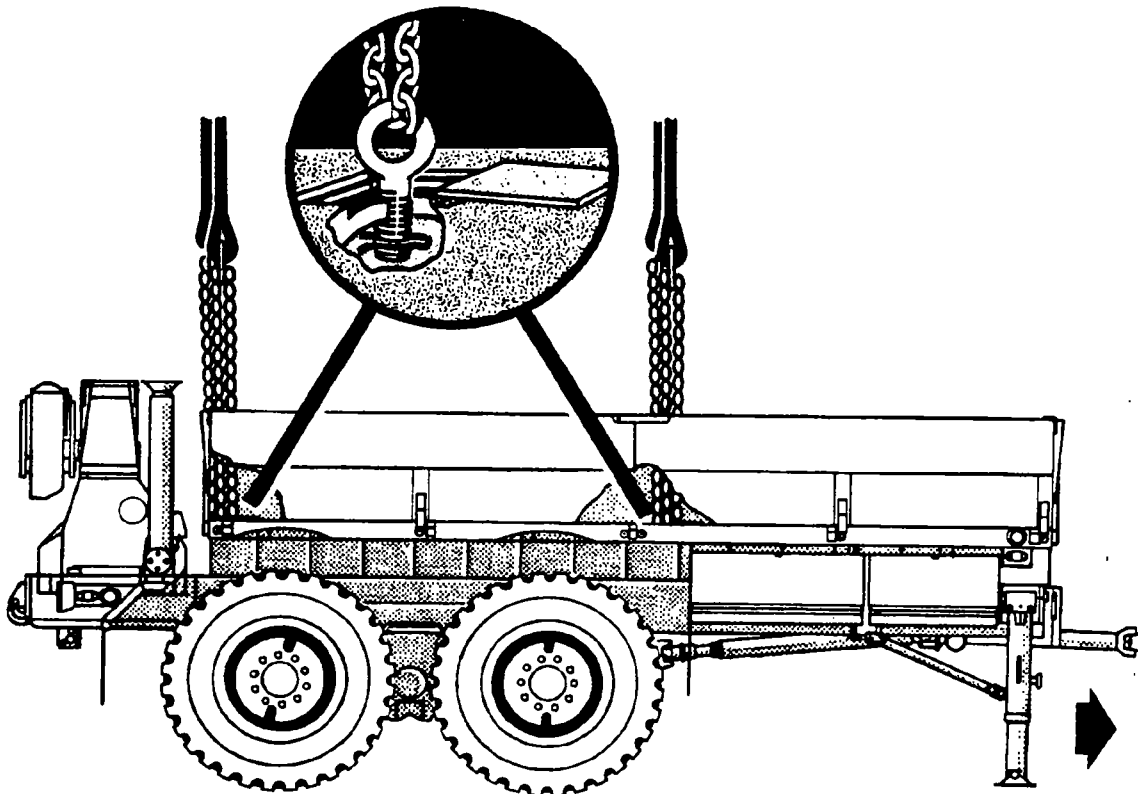
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting on top of the aft end of the trailer. Loop the chain end of the left and right sling legs through their respective lift provisions on the aft end of the trailer just forward of the crane and insert link 16 in the grab link. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the trailer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the forward end of the trailer. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the aft end of the trailer. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the trailer and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-14.1. M989A1, Heavy-Expanded Mobility Ammunition Trailer, HEMAT II**

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 130 knots.

LOAD DESCRIPTION

- M989A1, heavy-expanded mobility ammunition trailer, HEMAT II.
- NSN: 2330-01-275-7474.
- Weight: 10,650 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt, or suitable substitute.
- Tie-down strap, cargo, CGU-1/B (5,000-pound capacity) as required.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

CAUTION

The following rigging procedures are for the M989A1, HEMAT II only. DO NOT use these procedures when rigging the M989 HEMAT.

Step 1. Preparation

- Inspect the lift provisions at the four upper corners of the cargo bed.
- Ensure the trailer tongue is raised and secured with cargo strap prior to EAT.
- Secure brake hose, safety hose, intravehicular cable(s) and safety chains to the trailer and tongue with nylon cord and/or tape.
- Engage the steering lockout pin.
- Secure side panels to cargo deck with straps.

Step 2. Rigging

- **Forward sling set (2 sling legs):**
 - Connect two sling legs to apex fitting (number 1). Position the apex fitting on top of the front deck of the trailer.
 - Loop the chain end of both sling legs through their respective lift provision located at the front (tongue) end and insert link 15 in the grabhook.
- **Aft sling set (2 sling legs):**
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the rear deck of the trailer.
 - Loop the chain end of both sling legs through their respective lift provisions located at the rear end of the trailer and insert link 3 in the grabhook.
- **Secure excess chain with tape or nylon cord.**
- **Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the M989A1 to prevent entanglement during hookup and lift-off.**

Step 3. Hookup

NOTE: Connect the apex fittings to the cargo hooks so the tongue end is carried aft.

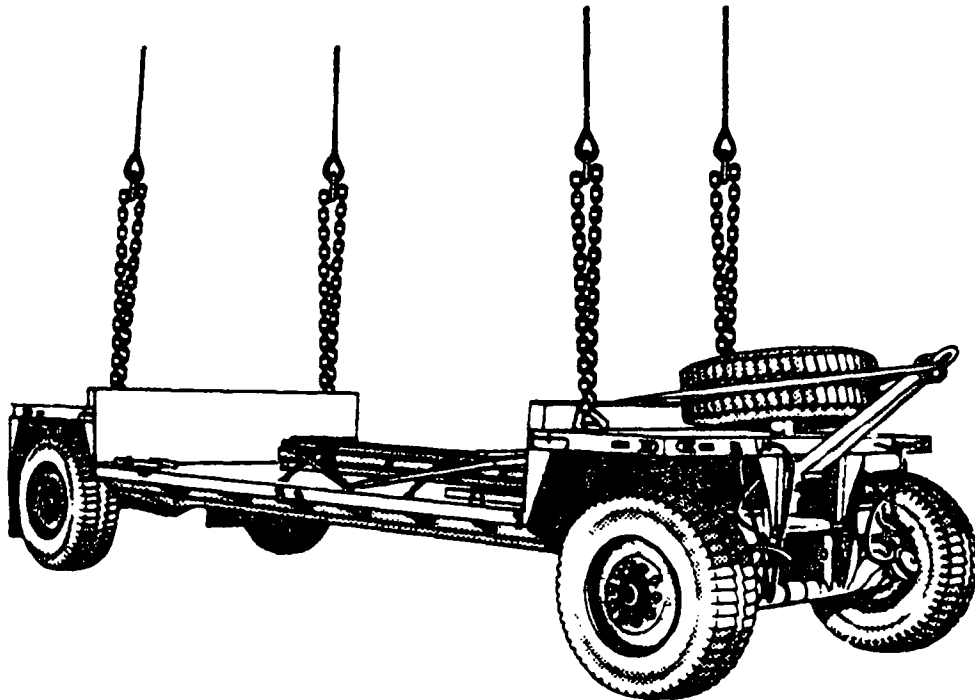
The hookup team stands on top of the M989A1. The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the front end of the trailer and places apex fitting 2 onto the forward cargo hook. The aft hookup person stands on the rear end of the trailer and places apex fitting 1 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

CAUTION

Brief the helicopter crew to relax sling leg tension and hover to the side of the load when releasing the apex fittings to prevent damage to the panels on top of the trailer.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.





TRUCK AND TOWED COMBINATIONS

The certified dual-point rigging procedures for truck and towed combinations are in this section. Figures 2-15 through 2-22 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-15. M151 1/4-Ton Truck with M416 1/4-Ton Trailer

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 100 knots.

LOAD DESCRIPTION

- Truck, utility, 1/4-ton, M151A1/2, LIN X61244.
- Trailer, cargo, 1/4-ton, M416, LIN W95400.
- Weight:
 - Truck, 2,400 pounds.
 - Trailer, 580 pounds.
 - Pay load, 500 pounds.
 - Total, 3,480 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Sling leg assembly (2,500-pound capacity), from a 10,000-pound capacity sling set (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt or suitable material.
- Tie-down strap, cargo, CGU-1/B, as required.
- Clevis assembly, small, MS 70087-1 (4 each).

PERSONNEL

Two personnel can prepare and rig the load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Remove tarpaulin from truck, lower windshield, and secure to hood with nylon cord. Fold tarpaulin and secure on top of windshield with nylon cord.
- Fold top bows of truck and secure seats.
- Lower side mirrors flush with truck body with glass side in and tape to side of truck.
- Remove and stow any antennas or floor coverings.
- Make sure fuel cap is secure; oil filler, radiator, and battery caps are properly installed; and hood latches are fastened tightly.
- Engage hand brake on truck and trailer and place transmission in neutral.
- Straighten truck front wheels and secure steering wheel in place with nylon cord.
- Pad the area above the rear wheels of the truck with felt and secure with nylon cord. Use a sheet of 12- x 30-inch felt with holes cut to align with the two brackets for the tie-down straps used to secure the truck bows. Secure with tape or nylon cord.
- Place the trailer lunette in truck trailer hitch and install locking pin. Attach safety chains to truck.
- Secure the trailer to the truck to prevent it from pivoting in flight by routing the hook end of one tie-down strap through the truck right rear tie-down ring and around the trailer axle. Connect the hook end in the ratchet hook end. Repeat with the other tie-down strap on the other side of the truck and trailer. Tighten both straps evenly. Secure the ratched handles closed with tape or nylon cord. Secure excess strap with tape or nylon cord.
- Secure trailer light cable to trailer tongue with tape or nylon cord.
- If cargo is carried, load and secure with rope or nylon cord.
- Wrap padding around trailer rear spring shackle mounting brackets and secure with tape.

Step 2. Rigging

- Forward sling set (4 sling legs):
 - Position the apex fitting on top of the truck.
 - Route outer sling legs 1 and 2 to the front of the truck and the inner sling legs 3 and 4 to the rear. Sling legs 1 and 3 should be on the left side of the truck.
 - Loop the chain end of sling leg 1 through the clevis on the left front wheel and insert link 3 in the grabhook. Repeat with sling leg 2 on the right front wheel clevis.
 - Loop the chain end of sling leg 3 through the clevis on the left rear wheel and insert link 3 in the grabhook. Repeat with sling leg 4 on the right rear wheel clevis.

- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting. Position the apex fitting on top of the trailer.
 - Loop the chain end of the left sling leg around the trailer left spring rear shackle mounting bracket and insert link 3 in the grabhook. Repeat with the other sling leg on the right spring shackle bracket.
- Pull each sling leg grabhook up on top of the load and, using cotton webbing or tape, tie the paired grabhooks together. Cluster and tie or tape (breakaway technique) sling legs in each sling set together on top of the truck or trailer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The static wand person discharges the static electricity with the static wand. The forward hookup person stands between the front seats and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands on the trailer and places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the load and remains close as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

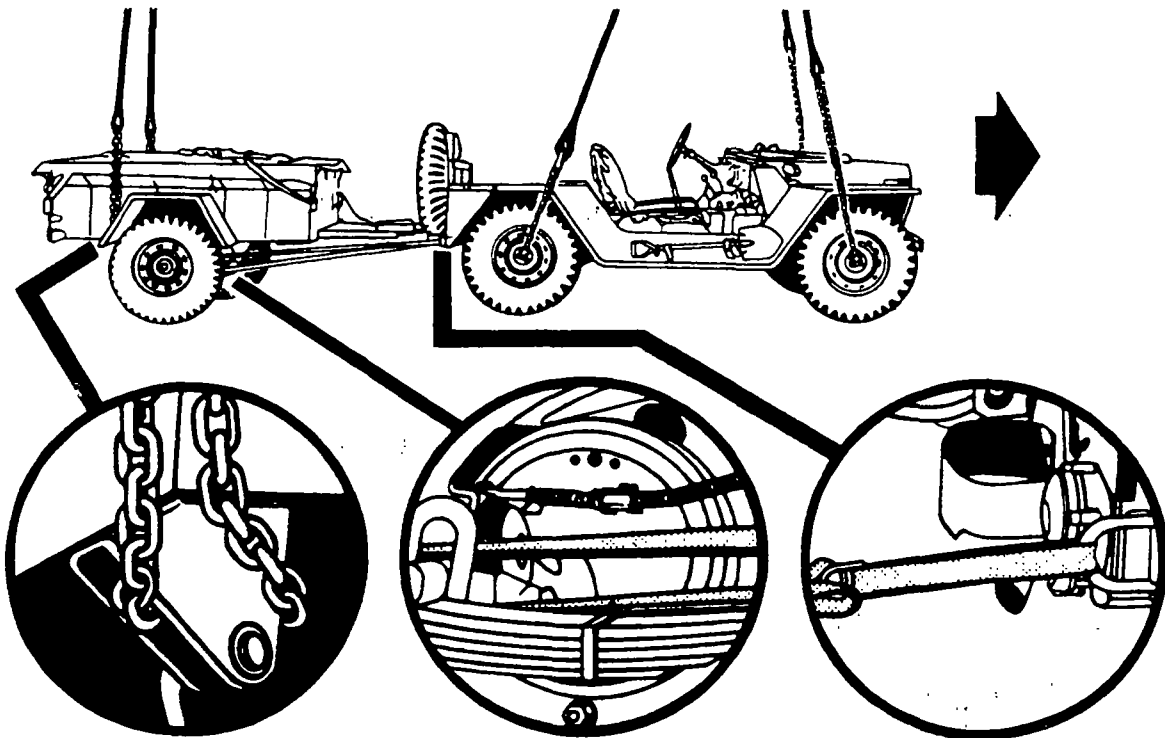


Figure 2-16. M151 1/4-Ton Truck with Radio, TTW Set, AN/VSC-2

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 100 knots.

LOAD DESCRIPTION

- Truck, utility, 1/4-ton, M151, with radio, TTW set, AN/VSC-2, LIN X60883.
- Trailer, 1/4-ton, M416, with two 3kw generators, LIN Q91301.
- Weight: 4,260 pounds.

MATERIALS

- Same as M151 1/4-ton truck with M416 1/4-ton trailer.
- Webbing, nylon, 1/2-inch tubular, 1,000-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Fold windshield down and secure with nylon cord.
- Remove canvas top, doors, side curtains, and so forth. Fold and stow on windshield and secure with nylon cord.
- Fold bows down and secure to truck with nylon cord. Secure radio and TTW to frame with 1/2-inch tubular nylon webbing. Secure steering wheel in position with 1/2-inch tubular nylon webbing. Fold mirrors back.
- Fold trailer leg in the UP position. Secure safety chains and vehicle cables to trailer tongue with nylon cord.
- Secure generators in trailer with 1/2-inch tubular nylon webbing. Stow and secure any extra equipment in trailer as applicable. Secure trailer tarp over trailer.
- Install a small clevis on all four wheels of the truck.
- Secure the trailer to the truck to prevent it from pivoting in flight by routing the hook end of one tie-down strap through the truck right rear tie-down ring and around the trailer axle. Connect the hook end in the ratchet hook end. Repeat with the other tie-down strap on the other side of the truck and trailer. Tighten both straps evenly. Secure the ratchet handles closed with tape or nylon cord. Secure excess strap with tape or nylon cord.

Step 2. Rigging

Same as M151 1/4-ton truck with M416 1/4-ton trailer (Figure 2-15).

Step 3. Hookup

Same as M151 1/4-ton truck with M416 1/4-ton trailer (Figure 2-15).

Step 4. Derigging

Same as M151 1/4-ton truck with M416 1/4-ton trailer (Figure 2-15).

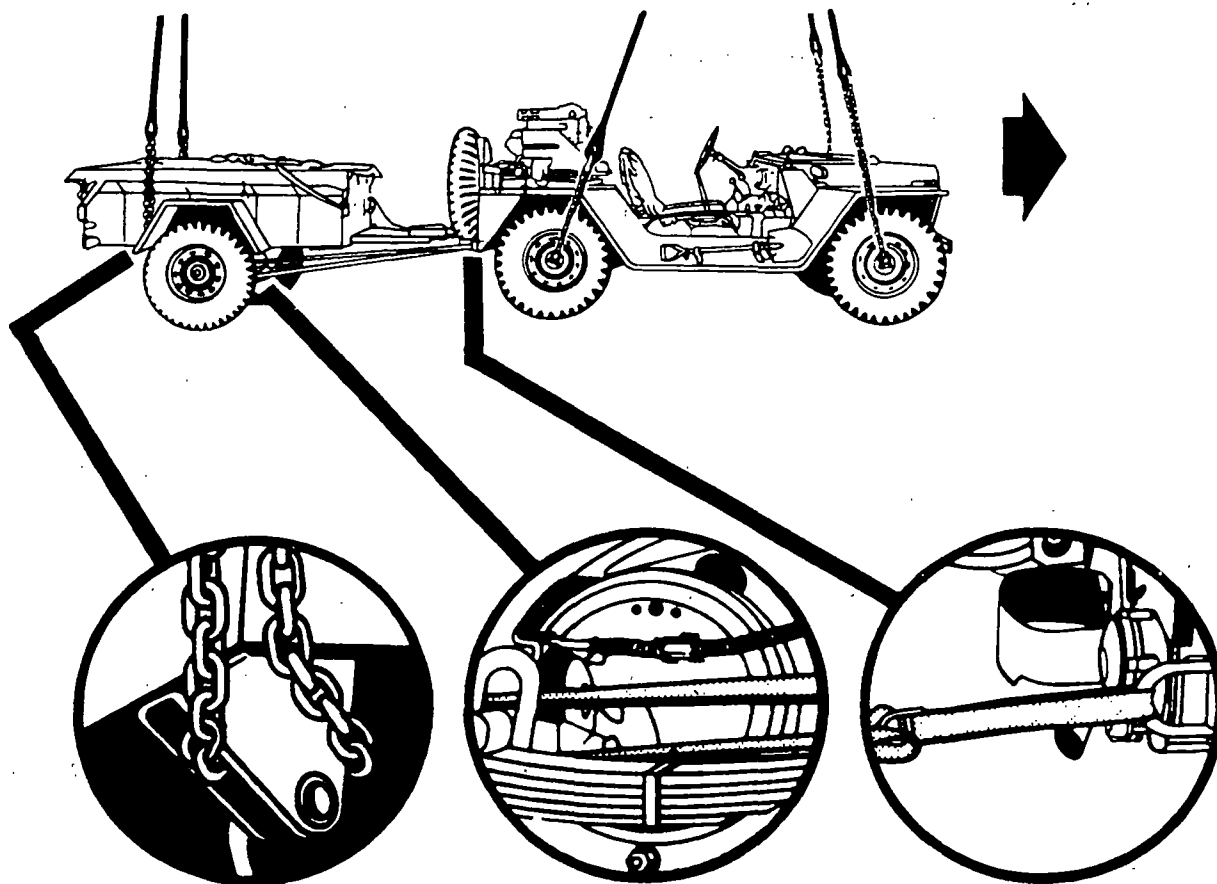


Figure 2-17. M561 Cargo Truck with M167 Gun (VULCAN)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- M561 truck, cargo, 1 1/4-ton, LIN X39940, and M167 20-mm gun, VULCAN, LIN J96845.
- Weight:
 - M561 truck, cargo, 7,460 pounds.
 - M167 gun, 3,260 pounds.
 - Total load, 10,720 pounds.

MATERIALS

- Sling set (10,000-pound capacity) (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (2 each).

PERSONNEL

Two persons can prepare and rig this load in 25 minutes.

PROCEDURES

Step 1. Preparation

- Attach the M167 gun to the truck by placing the gun lunette in the truck tow pintle and securing the latch. Secure the safety chains between the truck and gun, if available. Make sure that the M167 gun is straight in line with the truck.
- Route the hook end of one tie-down strap through the left rear lifting ring on the truck cargo compartment, through the anchored U-bolt on the left side of the gun frame, and connect to the tie-down strap ratchet hook. Repeat using the other tie-down strap on the right side of the load. Tighten both straps equally to prevent the truck and gun from pivoting during flight.
- M561 truck:
 - Remove canvas covers from the cab and cargo compartment. Remove windshield and bows. Secure all equipment inside the cargo compartment.

- Check batteries, seats, engine cover, and so forth, for security. Secure any loose equipment with tape or nylon cord.
- Engage the parking brake. Place the transmission in neutral.
- Install the truck truss kit assembly.

CAUTION: If the truss kit is unserviceable or cannot be properly installed, do not sling the truck with these procedures.

- M167 VULCAN gun:

- If the situation allows, place cover on gun and safety tie with nylon cord.
- Secure any loose equipment with tape or nylon cord, as required.
- Extend and secure the aft trails in the down position.

Step 2. Rigging

- M561 truck:

- Position the apex fitting on top of the engine compartment. Route outer sling legs 1 and 2 to the front of the truck and inner sling legs 3 and 4 to the rear of the cargo compartment. Sling legs 1 and 3 must be on the left side of the load.
- Loop the chain end of sling leg 1 through the left front lift provision on the front corner of the cab and insert link 3 in the grabhook. Repeat with sling leg 2 and the right front lift provision.
- Loop the chain end of sling leg 3 through the left rear lift provision on the aft left corner of the cargo compartment and insert link 55 in the grabhook. Repeat with sling leg 4 and the right rear lift provision. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs together on top of the truck to prevent entanglement during hookup and lift-off.

- M167 gun:

- Position apex fitting on top of the gun. Route outer sling legs 1 and 2 to the rear extended trails and inner sling legs 3 and 4 to the tongue end. Sling legs 1 and 3 must be on the same side of the load. Sling legs 1 and 2 are routed to the rear because the lift provisions on the trails are wider apart than the lift provisions on the tongue.
- Loop the chain end of sling leg 1 through the lift provision on the left trail and insert link 3 in the grabhook. Repeat with sling leg 2 and the right trail lift provision.
- Loop the chain end of sling leg 3 through the lift provision on top of the left side of the tongue and insert link 55 in the grabhook. Repeat with sling leg 4 on the tongue right lift provision. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs together on top of the gun to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Only one static wand person is required if contact is maintained with the static wand until both apex fittings are connected.

NOTE: Advise the aircraft commander to release the sling set apex fitting on the side of the gun away from the radar dish to prevent damage.

- M561 truck:

- The hookup team stands on the seat. The static wand person discharges the static electricity with static wand. The hookup man places the apex fitting onto the forward cargo hook.

- M167 gun:

- The hookup team stands alongside the gun or on the trailer frame on the same side as the radar dish. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting onto the aft cargo hook.
- The hookup teams then carefully dismount each load and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

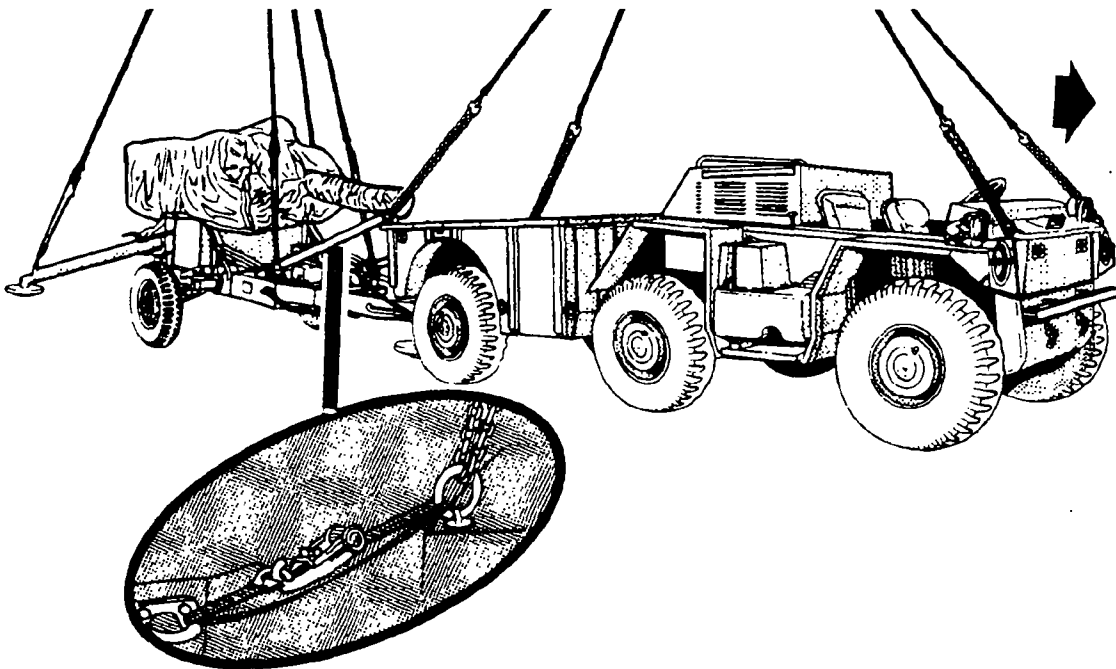


Figure 2-18. M561 Cargo Truck with M102 105-mm Howitzer

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- M561 truck, cargo, 1 1/4-ton, LIN X39940, and howitzer, M102, 105-mm, LIN K57392.
- Weight:
 - M561 truck, cargo, 7,460 pounds.
 - M102 howitzer, 3,330 pounds.
 - Total load, 10,790 pounds.

MATERIALS

- Sling set (10,000-pound capacity) (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (3 each).

PERSONNEL

Two persons can prepare and rig this load in 25 minutes.

PROCEDURES

Step 1. Preparation

- Attach the howitzer to the truck by placing the howitzer lunette in the truck tow pintle and securing the latch. Secure the safety chains between the truck and howitzer, if available. Make sure that the howitzer is straight in line with the truck.
- Route the hook end of one tie-down strap through the left rear lifting ring on the truck cargo compartment, under the howitzer trail and up over the howitzer cross member support beam located behind the trail lift provision on the howitzer. Place the hook end in the tie-down strap ratchet hook. Repeat using the other tie-down strap on the right rear lift ring of the truck and the right side of the howitzer. Tighten both straps equally to prevent the truck and howitzer from pivoting during flight.

- M561 truck:

- Remove canvas covers from the cab and cargo compartment. Remove windshield and bows. Secure all equipment inside the cargo compartment.
- Check batteries, seats, engine cover, and so forth, for security. Secure any loose equipment with tape or nylon cord.
- Engage the parking brake. Place the transmission in neutral.
- Install the truck truss kit assembly.

CAUTION: If the truss kit is unserviceable or cannot be properly installed, do not sling the truck with these procedures.

- M102 howitzer:

- Secure covers on the howitzer sights to protect from dust and debris during the hookup and lift-off.
- Tape or tie the brake light cable to the trail.
- Place section equipment chest on the end of the trails and secure with tie-down strap. Engage the hand brakes.

Step 2. Rigging

- M561 truck:

- Position the apex fitting on top of the engine compartment. Route outer sling legs 1 and 2 to the front of the truck and inner sling legs 3 and 4 to the rear of the cargo compartment. Sling legs 1 and 3 must be on the left side of the load.
- Loop the chain end of sling leg 1 through the lift provision on the front corner of the cab and insert link 4 in the grabhook. Repeat with sling leg 2 and right front lift provision.
- Loop the chain end of sling leg 3 through the lift provision on the left rear corner of the cargo compartment and insert link 60 in the grabhook. Repeat with sling leg 4 and the right rear lift provision. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs together on top of the truck to prevent entanglement during hookup and lift-off.

- M102 howitzer:

- Place the apex fitting on top of the breech. Route outer sling legs 1 and 2 to the trails and inner sling legs 3 and 4 to the barrel. Sling legs 1 and 3 must be on the left side of the howitzer.
- Loop the chain end of sling leg 1 through the lift provision mounted on the howitzer left trail and insert link 80 in the grabhook. Repeat with sling leg 2 on the howitzer right trail.

- Loop the chain end of sling legs 3 and 4 through the lift provision mounted on the howitzer tube and insert link 4 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs together on top of the howitzer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Only one static wand person is required if contact is maintained with the static wand until both apex fittings are connected.

NOTE: Advise the aircraft commander to release the sling set apex fitting on the side of the howitzer away from gun sights to prevent damage.

- M561 truck:
 - The hookup team stands on the seat. The static wand person discharges the static electricity with static wand. The hookup man places the apex fitting onto the forward cargo hook.
- M102 howitzer:
 - The hookup team stands on opposite trails of the howitzer. The static wand person discharges the static electricity with static wand. The hookup person places the apex fitting onto the aft cargo hook.
- The hookup teams then carefully dismount each load and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

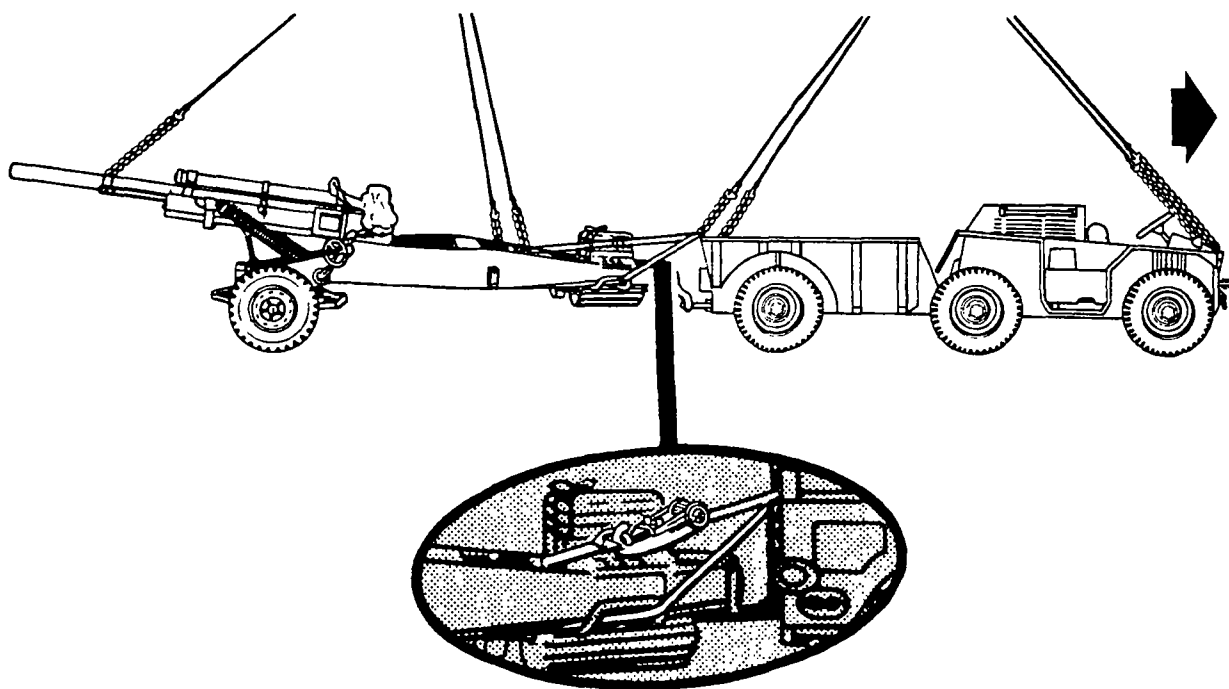


Figure 2-19. M998/M1038 Cargo Truck with M167 Gun (VULCAN)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 130 knots.

LOAD DESCRIPTION

- Truck, utility, 1 1/4-ton, (HMMWV), M998, LIN T61562; M1038, LIN T61562.
- Gun, AA, towed, 20-mm, M167, LIN J96845.
- Weight:
 - Truck, 5,200 pounds.
 - Cargo, 2,400 pounds.
 - Gun, 3,400 pounds.
 - Total, 11,000 pounds.

MATERIALS

- Sling set (10,000-pound capacity) (2 each).
- Strap, tie-down, CGU-1/B (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.

PERSONNEL

- Two persons can prepare and rig the M167 gun in 10 minutes.
- Two persons can prepare and rig the M998/M1038 truck in 15 minutes.

PROCEDURES

Step 1. Preparation

- Attach gun to truck by placing the lunette in the truck trailer hitch, locking the hitch, and securing the safety chains on the gun. Make sure that the gun is straight in line with the truck. Secure the gun to the truck by connecting the hook end of one tie-down strap to the anchored U-bolt on the left underside of the truck and the ratchet end of the strap to the anchored U-bolt on the left forward part of the gun frame. Connect the second tie-down strap to the U-bolts on the right side of the truck and gun. Tighten both ratchets at the same time to prevent the truck and gun from pivoting in flight. Secure the handles closed with tape or nylon cord.

- Fold mirrors forward in front of the windshield for added protection and tie them together with nylon cord. If installed, remove canvas covering over the bed of the truck. Remove the doors. If time permits, fold canvas top and secure on top of the windshield for added protection.
- Remove radio antenna. Secure loose equipment and cargo inside the truck with tape, nylon cord, or lashings.
- Ensure the truck front wheels are pointed straight ahead. Tie down the steering wheel using the securing device under the dash.
- Engage the truck parking brake and put the transmission in neutral.
- Secure the brake light cable to the drawbar on the gun. Place the radar in the upright position. Engage the hand brakes on the gun.

Step 2. Rigging

- M998/M1038 truck:
 - Position apex fitting on top of the truck. Route outer sling legs 1 and 2 to the front of the truck and inner sling legs 3 and 4 to the rear. Sling legs 1 and 3 must be on the left side of the truck.
 - Loop the chain end of sling leg 1 through the left lift provision that protrudes through the hood. Insert link 80 in the grabhook. Repeat with sling leg 2 and the right lift provision.
 - Route the chain end of sling leg 3 through the eyelet opening in the left upper corner of the tailgate. Loop the chain end through the lift shackle on the rear bumper and thread it back through the eyelet opening in the tailgate. Insert link 3 in the grabhook. Repeat with sling leg 4 and the right lift shackle.
 - Secure excess chain with tape or nylon cord.
 - Raise the apex fitting above the vehicle. Make sure the rear sling legs are kept to the rear of the vehicle. Cluster and tie or tape (breakaway technique) all sling legs above the vehicle to prevent entanglement during hookup.
- M167 gun:
 - Position apex fitting on top of the gun. Route outer sling legs 1 and 2 to the rear extended trails and inner sling legs 3 and 4 to the tongue end. Sling legs 1 and 3 must be on the same side of the load. Sling legs 1 and 2 are routed to the rear because the lift provisions on the rear trails are wider apart than the lifting provisions on the tongue.
 - Loop the chain end of sling leg 1 through the lift provision on the left trail and insert link 20 in the grabhook. Repeat with sling leg 2 and the right trail lift provision.
 - Loop the chain end of sling leg 3 through the lift provision on top of the left side of the tongue and insert link 90 in the grabhook. Repeat with sling leg 4 on the tongue right lift provision. Secure excess chain with tape or nylon cord.

- Cluster and tie or tape (breakaway technique) all sling legs together on top of the gun to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Only one static wand person is required if contact is maintained with the static wand until both apex fittings are connected.

NOTE: Advise the aircraft commander to release the sling set apex fitting on the side of the gun away from the radar dish to prevent damage.

- M998/M1038 truck:

- The hookup team stands in the bed of the truck. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting onto the forward cargo hook.

- M167 gun:

- The hookup team stands alongside the gun or on the trailer frame on the same side as the radar dish. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting onto the aft cargo hook.

- The hookup teams then carefully dismount each load and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

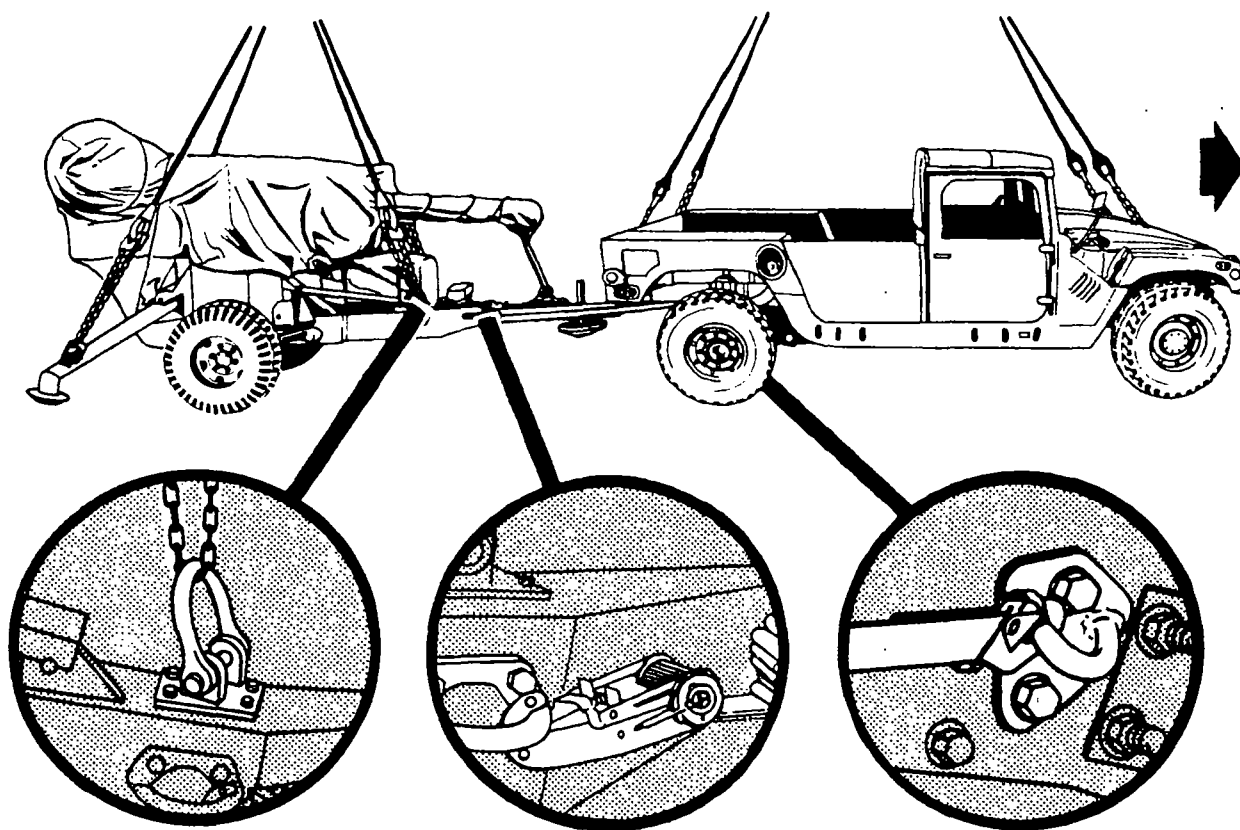


Figure 2-20. M998/M1038 Cargo Truck with M102 105-mm Howitzer

APPLICABILITY

This load, with or without an accompanying load, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 90 and 100 knots, respectively.

LOAD DESCRIPTION

- Truck, utility, 1 1/4-ton, (HMMWV), M998, LIN T61491; M1038, LIN T61562.
- Howitzer, M102, 105-mm, LIN K57392.
- Weight:
 - Truck, 5,200 pounds (empty), 7,700 pounds (loaded).
 - M102 howitzer, 3,160 pounds.
 - Accompanying load, 2,860 pounds (maximum).
 - Total load, 8,360 to 13,720 pounds.

MATERIALS

- Sling set (10,000-pound capacity) (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt or equivalent.
- Clevis assembly, Type V platform, NSN 1670-01-162-2372 (2 each).
- Tie-down strap, cargo, CGU-1/B (3 each).
- If an accompanying load is carried:
 - 5,000- or 10,000-pound capacity cargo net.
 - Clevis assembly, large, MS 70087-3 or
 - Apex fitting (10,000-pound capacity).
- If a 25,000-pound sling set is used to rig the howitzer:
 - Clevis assembly, Type V platform, (3 each) or
 - Clevis assembly, medium, MS 70087-2 (3 each).

PERSONNEL

Two persons can prepare and rig this load in 25 minutes.

PROCEDURES

Step 1. Preparation

- Position the truck and howitzer on a flat, level surface. Make sure that the howitzer is straight in line with the truck.
- Attach the howitzer to the truck by placing the howitzer lunette on the truck pintle hook and securing the latch. Secure the safety chains between the truck and howitzer, if available.
- Position one Type V platform clevis assembly in the tie-down provision located on the outboard side of the truck frame above the left rear wheel. Make sure that the bolt end of the clevis is facing toward the howitzer. Route the free end of one tie-down strap under the howitzer left trail, up over the trail box cross member support, through the Type V platform clevis, and connect it to the hook on the ratchet.
- Repeat the previous procedure using the other clevis assembly and tie-down strap on the right side of the truck and howitzer.
- Position padding between the strap and the angled bracket (gusset) located forward of the rear lift provision on the truck. Tighten both straps equally to prevent the truck and howitzer from pivoting in flight. Secure the ratchet handles with tape or nylon cord.
- Make sure the howitzer is securely connected to the truck. DO NOT connect the tie-down straps to the rear wheels, since the wheels will rotate and the tie-down straps will not stay tight.
- Fold the truck mirrors forward in front of the windshield for added protection and tie together with nylon cord. If installed, remove the canvas covering over the bed of the truck. Remove the doors. If time permits, fold canvas top and tie to windshield for added protection.
- Secure all loose equipment, cargo, and antennas inside the truck with tape, nylon cord, or lashings.
- Make sure that the fuel tank is not over 3/4 full. Inspect fuel tank cap, oil filler cap, and battery caps for proper installation.
- Make sure the truck front wheels are pointing straight forward. Tie down the steering wheel using the securing device attached under the dash.
- Engage the truck parking brake. Place the transmission in neutral.
- Tape or tie the brake light cable to the howitzer trail.
- Secure cover on the howitzer sights to protect from dust and debris during the hookup and lift-off.
- Place section equipment chest on end of trails and secure with tie-down strap. Engage the howitzer hand brake.

- Rig the cargo net according to instructions in Chapter 1. Make sure the cargo net is positioned close enough to the howitzer so the lifting legs and apex fitting can be routed under the howitzer trails. Connect the large clevis or 10,000-pound apex fitting to the cargo net apex fitting.

Step 2. Rigging

- Truck:

- Position apex fitting on top of the truck cargo compartment. Route outer sling legs 1 and 2 to the front of the truck and inner sling legs 3 and 4 to the rear. Sling legs 1 and 3 must be on the left side of the truck.
- Loop the chain end of sling leg 1 through the left front lift provision that protrudes through the hood and insert link 36 (link 40 if carrying an accompanying load) in the grabhook. Repeat with sling leg 2 and the right front lift provision.
- Route the chain end of sling leg 3 through the eyelet opening in the upper left corner of the tailgate, through the left lifting shackle on the rear bumper and thread back through the eyelet opening in the tailgate. Insert link 8 in the grabhook. Repeat with sling leg 4 on the right rear lifting shackle.
- Secure excess chain with tape or nylon cord.
- Raise the apex fitting above the truck. Make sure the rear sling legs are kept to the rear of the truck. Cluster and tie or tape (breakaway technique) all sling legs together on top of the truck to prevent entanglement during hookup and lift-off.

- M102 howitzer:

NOTE: If a 25,000-pound sling set is used to rig the howitzer, attach a Type V platform clevis to each lifting provision on the howitzer. Position the bell or loop end of the clevis next to the lifting provision pin. Secure the nut on the clevis bolt to prevent loosening during flight.

- Place the apex fitting on top of the breech. Route outer sling legs 1 and 2 to the trails and inner sling legs 3 and 4 to the barrel. Sling legs 1 and 3 must be on the left side of the howitzer.
- Loop the chain end of sling leg 1 through the lifting provision mounted on the howitzer left trail and insert link 83 in the grabhook. If an accompanying load is carried, loop the chain end through the lift provision, through the large clevis or apex fitting connected to the accompanying load, and insert link 58 in the grabhook. Repeat with sling leg 2 on the howitzer right trail.
- Loop the chain end of sling legs 3 and 4 through the lifting provision mounted on the howitzer barrel and insert link 9 (link 6 if carrying an accompanying load) in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs together on top of the howitzer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Advise the aircraft commander to release the sling set apex fitting on the side of the howitzer away from the gun sights to prevent damage.

NOTE: Only one static wand person is required if contact is maintained with the cargo hook until both apex fittings are connected.

- Truck:
 - The hookup team stands in the bed of the truck. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting onto the forward cargo hook.
- M102 howitzer:
 - The hookup team stands on opposite trails of the howitzer. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting onto the aft cargo hook.
- The hookup teams then carefully dismount each load and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging.

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

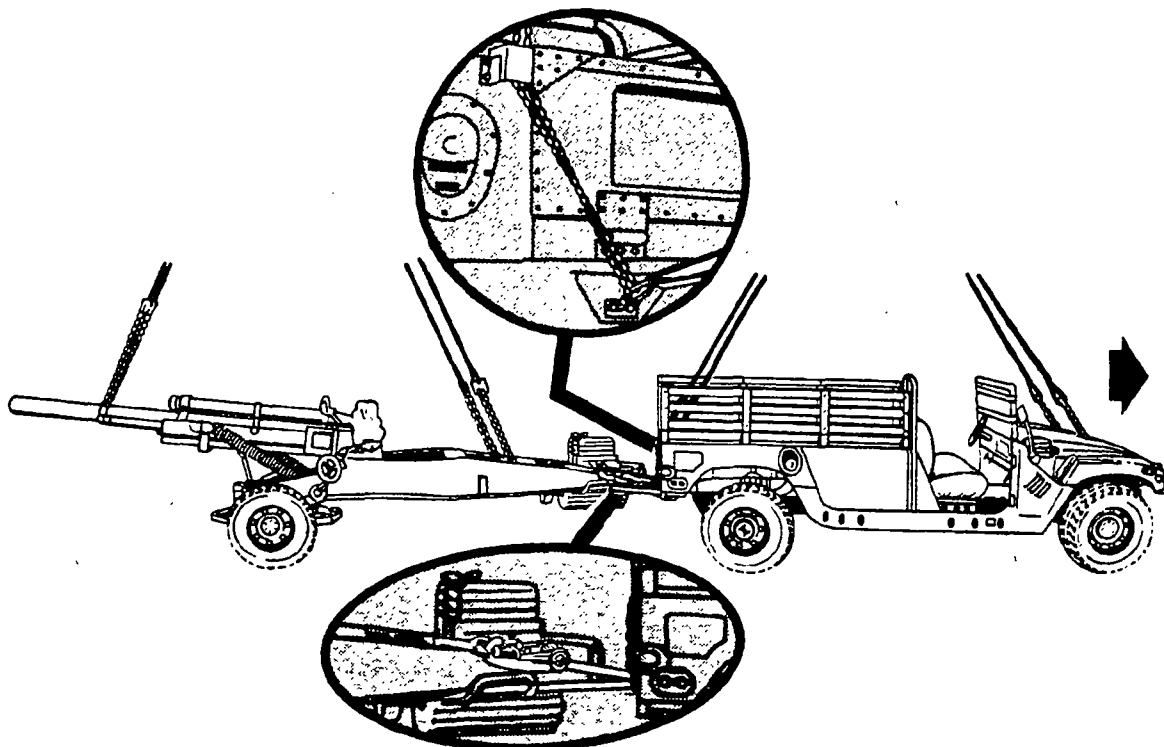


Figure 2-21. M1037 Shelter Carrier with PU-751/M or PU-753/M Generator Set

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 110 knots.

LOAD DESCRIPTION

WARNING

Maximum rigged gross weight for the PU-751/M and PU-753/M generator set is 3,000 pounds.

- Truck, 1 1/4-ton, M1037 shelter carrier with PU-751/M generator set.
 - Truck, M1037, LIN T07543, and PU-751/M, LIN G37273.
 - Weight (pounds):

VARIANTS	HMMWV CURB WEIGHT	GENERATOR
LOS (V1)	8,106	2,772
LOS (V2)	8,181	2,776
NC LOS (V3)	8,099	2,772
LEN LOS (V4)	7,894	2,772
SCC Planning	7,815	2,531
Radio Accessories	8,410	2,751

- Truck, 1 1/4-ton, M1037 shelter carrier with PU-753/M generator set.
 - Truck, M1037, LIN T07543, and PU-753/M, LIN G40744.
 - Weight (pounds):

VARIANTS	HMMWV CURB WEIGHT	GENERATOR
SEN (V1)	8,059	2,759
SEN (V2)	8,181	2,759
Maintenance 1	8,049	2,680
NC Operations	8,263	2,681
NC Management	7,737	2,681
LEN Operations	8,412	2,759
LEN Management	8,100	2,681
SCC Technical	8,237	2,681

MATERIALS

- Sling set, 10,000-pound capacity (2 each).
- Cord, nylon, Type III, 550-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (2 each).
- Padding, cellulose or suitable material.

PERSONNEL

- Two persons can prepare and rig the truck in 15 minutes.
- Two persons can prepare and rig the generator set in 10 minutes.

PROCEDURES

Step 1. Preparation

- Attach the power generator set to the truck shelter carrier:
 - Place the trailer lunette in the truck trailer hitch. Lock the hitch and connect the generator trailer safety chains to the truck.
 - Secure the trailer to the truck to prevent it from pivoting in flight by connecting the hook end of one tie-down strap to the lift provision on the left forward part of the trailer frame. Connect the ratchet end of the tie-down strap to the tie-down provision located on the truck bumper on either side of the truck trailer hitch. Install the tie-down provisions from the front bumper on the rear bumper, if necessary.
 - Repeat with the other tie-down strap on the right side of the truck and trailer.
 - Tighten both straps evenly. Secure the ratchet handles closed with tape or nylon cord. Secure excess strap with tape or nylon cord.
- M1037 truck shelter carrier:
 - Fold mirrors forward in front of the windshield for added protection and tie together using nylon cord.
 - Make sure that the shelter is secured to the truck using the wire rope or tie-down assemblies. Secure all loose equipment inside the shelter with tape, nylon cord, or lashings. Close and secure the door.
 - Secure all other loose equipment inside the vehicle with tape, nylon cord, or lashings.
 - Make sure the vehicle fuel tank is not over 3/4 full. Inspect the fuel tank cap, oil filler cap, and battery caps for proper installation.
 - Engage the vehicle parking brake and put the transmission in neutral.

- Make sure that the truck front wheels are pointed straight ahead. Tie down the steering wheel using the securing device attached under the dashboard.
- Install lift provisions on the outer ends of the rear bumper. Remove the tie-down provisions from the front bumper and install on the outer ends of the rear bumper, if necessary.
- PU-751/M or PU-753/M generator set:
 - Partially retract all landing legs. Secure in position and tie with nylon cord.
 - Retract lunette leg. Secure in position and tie with nylon cord.
 - Engage both hand brakes.
 - Tape or tie brake hose and light cable to the top of the drawbar.
 - Secure all lids, doors, and caps with nylon cord or tape.

Step 2. Rigging

- M1037 truck shelter carrier:
 - Position apex fitting on top of the shelter. Route outer sling legs 1 and 2 to the front of the vehicle and inner sling legs 3 and 4 to the rear. Sling legs 1 and 3 should be on the left side of the load.
 - Loop the chain end of sling leg 1 through the left front lift provision that protrudes through the hood and insert link 80 in the grabhook. Repeat with sling leg 2 on the right front lift provision.
 - The rear lift provisions are located on the outer ends of the rear bumper. Do not loop the chain ends through the tie-down shackles located near the center of the rear bumper. Loop the chain end of sling leg 3 through the left rear lift provision and inset link 30 in the grabhook. Repeat with sling leg 4 on the right rear lift provision.
 - Secure excess chain with tape or nylon cord.
 - Secure padding to the sling legs with tape or nylon cord in areas where they may rub against the side of the shelter.
 - Raise the apex fitting above the shelter carrier. Make sure the rear sling legs are kept to the sides of the shelter and shelter carrier.
 - Cluster and tie or tape (breakaway technique) all sling legs together to prevent entanglement during hookup and lift-off.
- PU-751/M or PU-753/M generator set:
 - Position apex fitting on top of the generator set. Route outer sling legs 1 and 2 between the two front bows to the front of the generator and the inner sling legs 3 and 4 between the two rear bows to the rear of the generator set. Sling legs 1 and 3 should be on the left side of the generator.

- Loop the chain end of sling leg 1 through the left front lift provision located on the left front corner of the trailer and insert link 90 in the grabhook. Repeat with sling leg 2 on the right front lift provision.
- Loop the chain end of sling leg 3 through the left rear lift provision located on the left rear corner of the trailer chassis and insert link 20 in the grabhook. Repeat with sling leg 4 on the right rear lift provision. Secure excess chain with tape or nylon cord.
- Make sure sling leg 1 does not become fouled on the cable reel handle during hookup. Tape the sling leg (breakaway technique) to the front bow of the trailer.
- Cluster and tie or tape (breakaway technique) all sling legs together on top of the generator to prevent entanglement during hookup and lift-off.

Step 3. Hookup

Two hookup teams are used for this load. The static wand person discharges the static electricity with the static wand. One hookup person kneels on top of the shelter and places the truck apex fitting onto the forward cargo hook. The other hookup person stands on the generator fender and places the generator set apex fitting onto the aft cargo hook. Do not use the center cargo hook. The hookup teams then carefully dismount each load and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

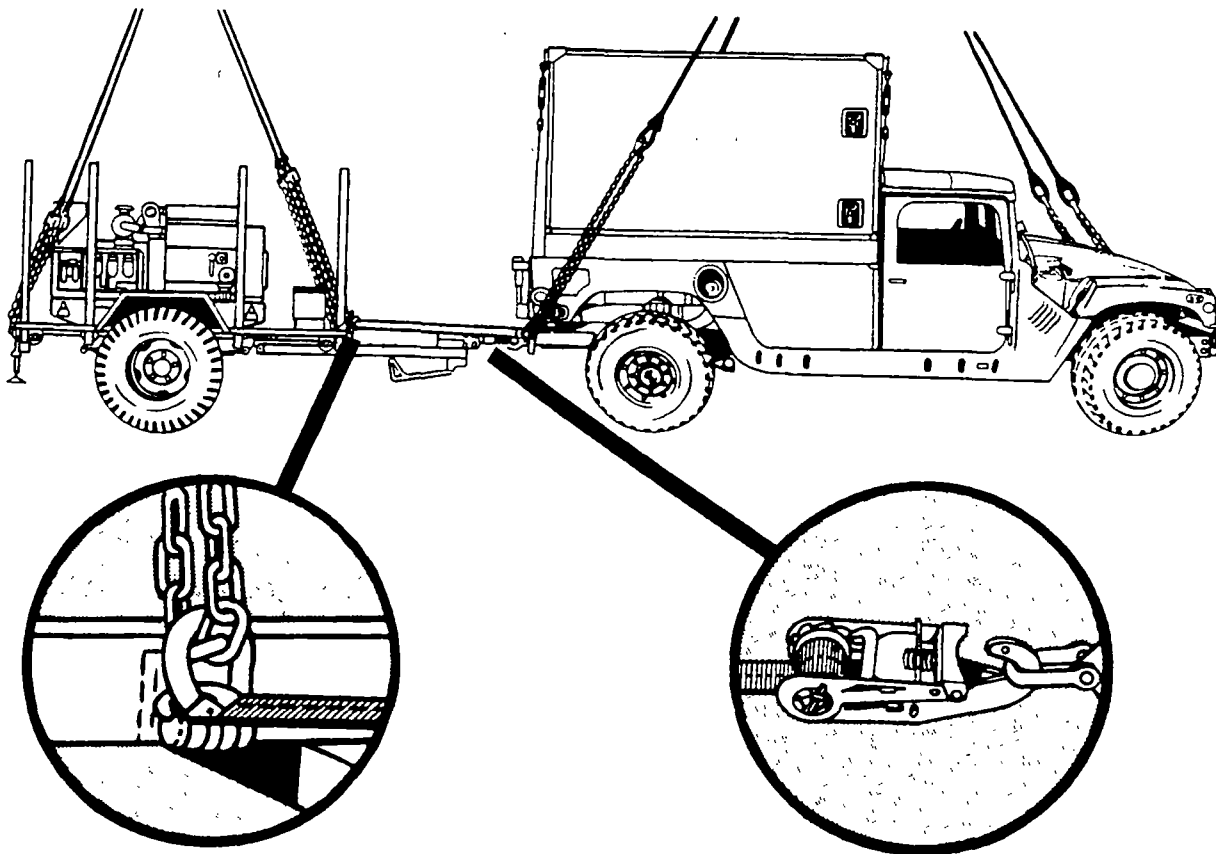


Figure 2-22. M1037 Shelter Carrier with M101A2 Trailer

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 110 knots.

LOAD DESCRIPTION

- Truck, 1 1/4-ton, M1037 shelter carrier, LIN T07543, with trailer, 3/4-ton, M101A2, LIN W95537.
 - Weight (pounds):

WARNING

Do not rig or lift this load at weights or configurations different than below. Failure to comply may result in load/sling failure.

VARIANTS	M1037 CURB WEIGHT	M101A2
NC Support	8,227	2,643
LEN Cable Vehicle	8,148	2,796
SCC Command V1	8,346	1,981
SCC Command V2	8,346	1,430
Management 2	7,905	1,430

NOTE: Instead of a S-250 shelter in the back, the NC support vehicle and the LEN cable vehicle have a canvas enclosed cargo bed.

MATERIALS

- Sling set (10,000-pound capacity) (2 each).
- Cord, nylon, Type III, 550-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B, as required.
- Padding, cellulose or suitable material.

PERSONNEL

Step 1. Preparation

- Attach the trailer to the truck shelter carrier:
 - Place the trailer lunette in the truck trailer hitch. Lock the hitch and connect the trailer safety chains to the truck.
 - Secure the trailer to the truck to prevent it from pivoting in flight by connecting the hook end of one tie-down strap to the lift provision on the left forward part of the trailer frame. Connect the ratchet end of the tie-down strap to the tie-down provision located on the truck bumper on either side of the truck trailer hitch. Install the tie-down provisions from the front bumper on the rear bumper, if necessary.
 - Repeat with the other tie-down strap on the right side of the truck and trailer.
 - Tighten both straps evenly. Secure the ratchet handles closed with tape or nylon cord. Secure excess strap with tape or nylon cord.
- M1037 truck shelter carrier:
 - Fold mirrors forward in front of the windshield for added protection and tie together using nylon cord.
 - Make sure that the shelter is secured to the truck using the wire rope or tie-down assemblies. Secure all loose equipment inside the shelter with tape, nylon cord, or lashings. Close and secure the door.
 - Secure all other loose equipment inside the vehicle with tape, nylon cord, or lashings.
 - Make sure the vehicle fuel tank is not over 3/4 full. Inspect the fuel tank cap, oil filler cap, and battery caps for proper installation.
 - Engage the vehicle parking brake and put the transmission in neutral.
 - Make sure that the truck front wheels are pointed straight ahead. Tie down the steering wheel using the securing device attached under the dashboard.
 - Install lift provisions on the outer ends of the rear bumper. Remove the tie-down provisions from the front bumper and install on the outer ends of the rear bumper, if necessary.
- M101A2 trailer:
 - Remove front rack and place in bed of the trailer. Load cargo on top of the rack.
 - Fasten the tailgate in the open position with the chains on each side hooked through the keeper.
 - Secure cargo in the bed of the trailer with the tie-down straps. Attach the hook end of one tie-down strap around the tailgate left hinge. Loop the tie-down strap diagonally over the load and connect the ratchet end to the right front lifting shackle. Secure loose end of strap.

- Repeat with the other tie-down strap using the tailgate right hinge and left front lifting shackle. Secure loose end of strap.
- Tape or tie the light cable firmly to the top of the drawbar.
- Engage the parking brake. Secure the landing leg in the raised position with nylon cord.

Step 2. Rigging

- M1037 truck shelter carrier

- Position apex fitting on top of the shelter. Route outer sling legs 1 and 2 to the front of the vehicle and inner sling legs 3 and 4 to the rear. Sling legs 1 and 3 should be on the left side of the load.
- Loop the chain end of sling leg 1 through the left front lift provision that protrudes through the hood and insert link 80 in the grabhook. Repeat with sling leg 2 on the right front lift provision.
- The rear lift provisions are located on the outer ends of the rear bumper. Do not loop the chain ends through the tie-down shackles located near the center of the rear bumper. Loop the chain end of sling leg 3 through the left rear lift provision and insert link 30 in the grabhook. Repeat with sling leg 4 on the right rear lift provision.
- Secure excess chain with tape or nylon cord.
- Secure padding to the sling legs with tape or nylon cord in areas where they may rub against the side of the shelter.
- Raise the apex fitting above the shelter carrier. Make sure the rear sling legs are kept to the sides of the shelter and shelter carrier.
- Cluster and tie or tape (breakaway technique) all sling legs together to prevent entanglement during hookup and lift-off.

- M101A2 trailer:

- Position apex fitting on top of the trailer. Route outer sling legs 1 and 2 to the front of the trailer. Route inner sling legs 3 and 4 to the rear of the trailer through the opening between the tailgate and the trailer bed. Each chain must be routed on the inboard side of the tailgate hinge. Sling legs 1 and 3 should be on the same side of the load.
- Loop the chain end of sling leg 1 through the left front lift provision located on the front of the trailer and insert link 90 in the grabhook. Repeat with sling leg 2 on the right front lift provision.
- Loop the chain end of sling leg 3 through the left rear lift provision and insert link 70 in the grabhook. Repeat with sling leg 4 on the right rear lift provision.
- Secure excess chain with tape or nylon cord.

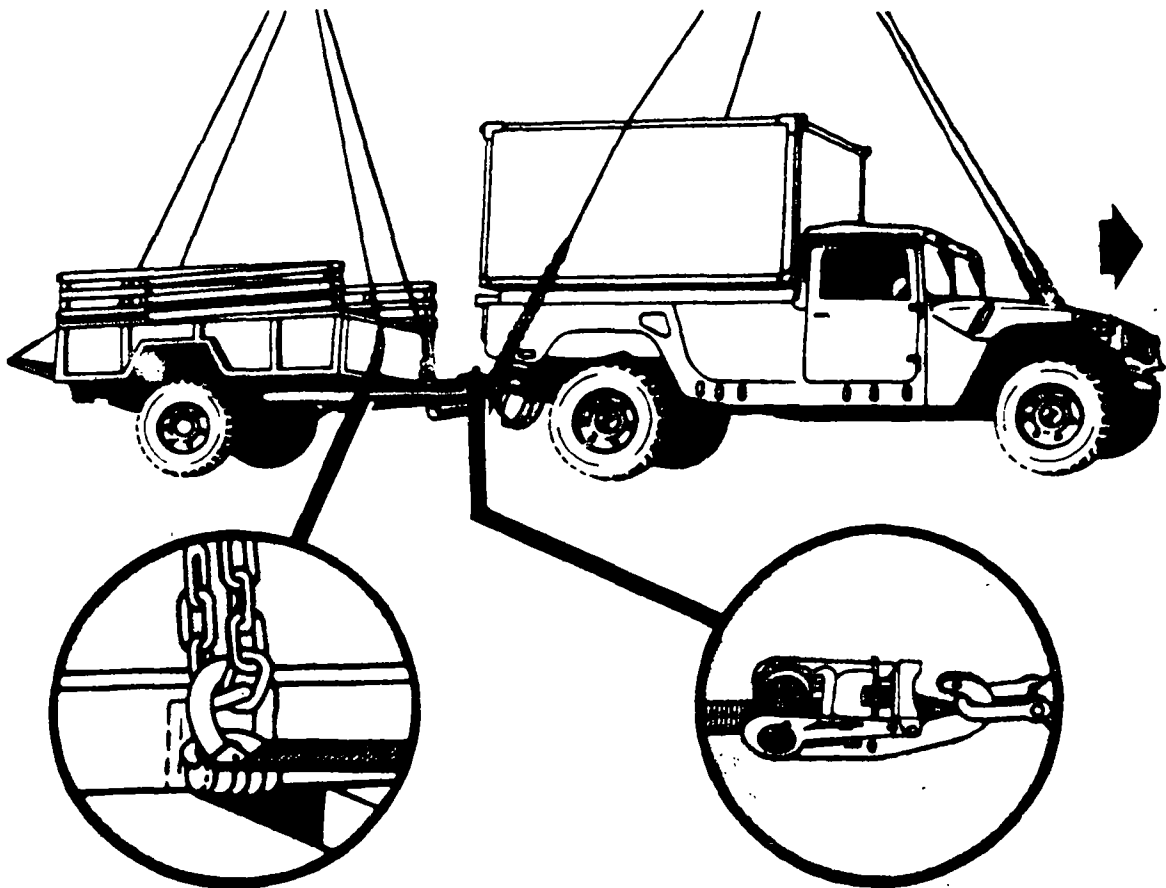
- Lift sling leg 3 and tie or tape (breakaway technique) grabhook or sling leg to the trailer side rack so the chain does not become slack and bind in the opening between the tailgate and trailer bed. Repeat with sling leg 4 on the other side rack.
- Cluster and tie or tape (breakaway technique) all sling legs together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

Two hookup teams are used for this load. The static wand person discharges the static electricity with the static wand. One hookup person kneels on top of the shelter and places the truck apex fitting onto the forward cargo hook. The other hookup person stands on the generator fender and places the generator set apex fitting onto the aft cargo hook. Do not use the center cargo hook. The hookup teams then carefully dismount each load and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



HOWITZERS AND WEAPONS SYSTEMS

*The certified dual-point rigging procedures for howitzers are in this section. Figures 2-23 through 2-26.1 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-23. M101A1 Howitzer, 105-mm, with or without A-22 Cargo Bags

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters in configurations as identified under LOAD DESCRIPTION.

LOAD DESCRIPTION

LOAD	WEIGHT (pounds)	AIRSPPEED (knots)
M101A Howitzer	4,980	120
M101A Howitzer with 1 A-22 Cargo Bag	7,180	120
M101A Howitzer with 2 A-22 Cargo Bags	9,380	120
M101A Howitzer with 3 A-22 Cargo Bags	11,580	120

MATERIALS

- Sling set (10,000-pound or 25,000-pound capacity) with one additional apex fitting (10,000-pound or 25,000-pound capacity to match sling set).

NOTE: The 25,000-pound capacity sling set is preferred; however, the 10,000-pound capacity sling set may be used for the howitzer (without accompanying A-22 cargo bag). Because of the additional weight of A-22 cargo bags, use the 25,000-pound capacity sling set if accompanying A-22 cargo bags are to be transported.

- Felt sheeting, as required.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Additional sling leg assemblies (2,500-pound capacity) from 10,000-pound capacity sling set (1 per A-22 cargo bag).
- Additional apex fitting (1 per accompanying load).

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Close and lock the breech.
- Ensure that the trails are properly closed and secured. Rotate the lunette downward. Safety the trail closing lock handle with nylon cord or tape.
- Ensure that muzzle cover, breech and tube covers, and all stowed equipment are properly secured. Use tape or nylon cord, as required.
- Pad the gun tube above the cradle around the forward edges of the sleigh assembly with felt sheeting. Tape or tie the padding firmly in place.
- Pad each trail aft of the traveling lock shaft with felt sheeting. Tape the padding firmly in place.

Step 2. Rigging

NOTE: The chain link number inside parentheses is used for the 10,000-pound capacity sling set.

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the sling set on top of the breech. Both sling legs go around the barrel.
 - Wrap the chain end of both sling legs around the felt padded muzzle (one complete wrap) and insert link 12 (30) into the grabhook. Loosely secure chain legs to gun tube with nylon cord.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position sling set on top of the gun trails.
 - Wrap the chain end of sling leg 1 around the left felt padded trail (two complete wraps) and insert link 12 (30) into the grabhook. Repeat with the other sling leg and the right trail.
- Secure excess chain with tape or nylon cord.
- If accompanying A-22 cargo bags are to be transported, rig the A-22 cargo bags in the following manner:
 - Use one sling leg (2,500-pound capacity) from a 10,000-pound capacity sling set for each A-22 cargo bag. Route the chain end of the sling leg through the A-22 cargo bag clevis and insert link 3 in the grabhook.

- Place the other end of the sling leg(s) in the additional apex fitting. Position the apex fitting on the ground between the gun trails.
- Route the chain ends of the two sling legs of the rear sling set down the outside of the respective trail, under the gun trail, and through the apex fitting. Insert link 12 in the grabhook. Keep the apex fitting centered between the gun trails. One, two, or three A-22 cargo bags may be attached to this apex fitting.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set to prevent entanglement during hookup.

Step 3. Hookup

The static wand person stands on the trails and discharges the static electricity with the static wand. The forward hookup person straddles the gun barrel and places apex fitting onto the forward cargo hook. The aft hookup person stands on the trails and places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts and remains close to the load as the helicopter removes slack in the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

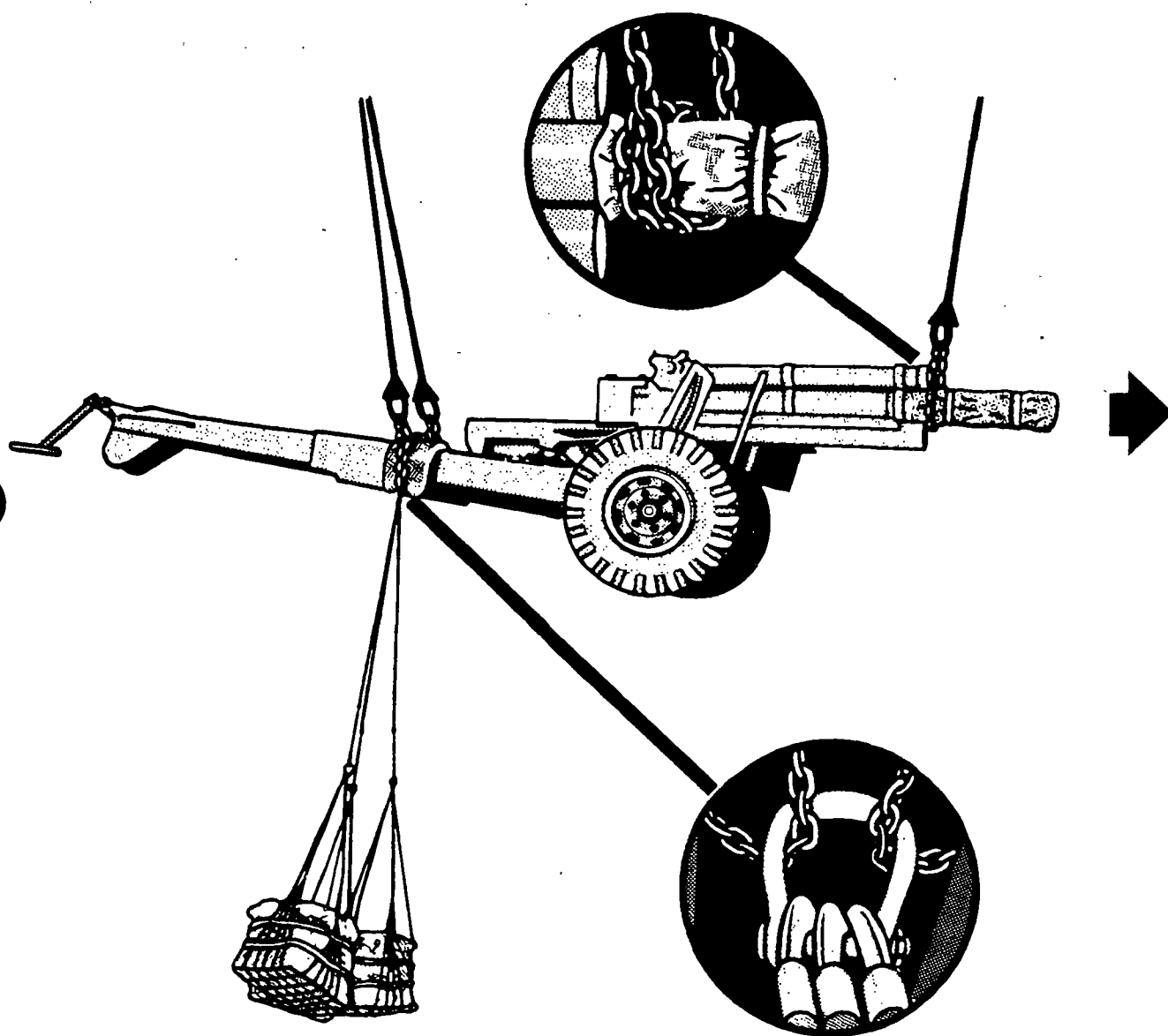


Figure 2-24. M102 105-mm Howitzer

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 130 knots.

LOAD DESCRIPTION

- Howitzer, towed, 105-mm, M102, LIN K57392.
- Weight: 3,330 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU1/B, as required.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Place muzzle and sight covers on howitzer and secure with nylon cord.
- Place section equipment chest on end of trails and secure with tie-down strap.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the howitzer tube.
 - Loop the chain end of both sling legs through the lifting bracket on the howitzer tube and insert link 70 in to the grabhook. Secure excess chain with tape or nylon cord.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 2. Position the apex fitting between the trails.

- Loop the chain end of the left and right sling legs through their respective lift provisions on the trails and insert link 3 in the grabhook.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the howitzer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the wheel and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands on the trails and places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the howitzer and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

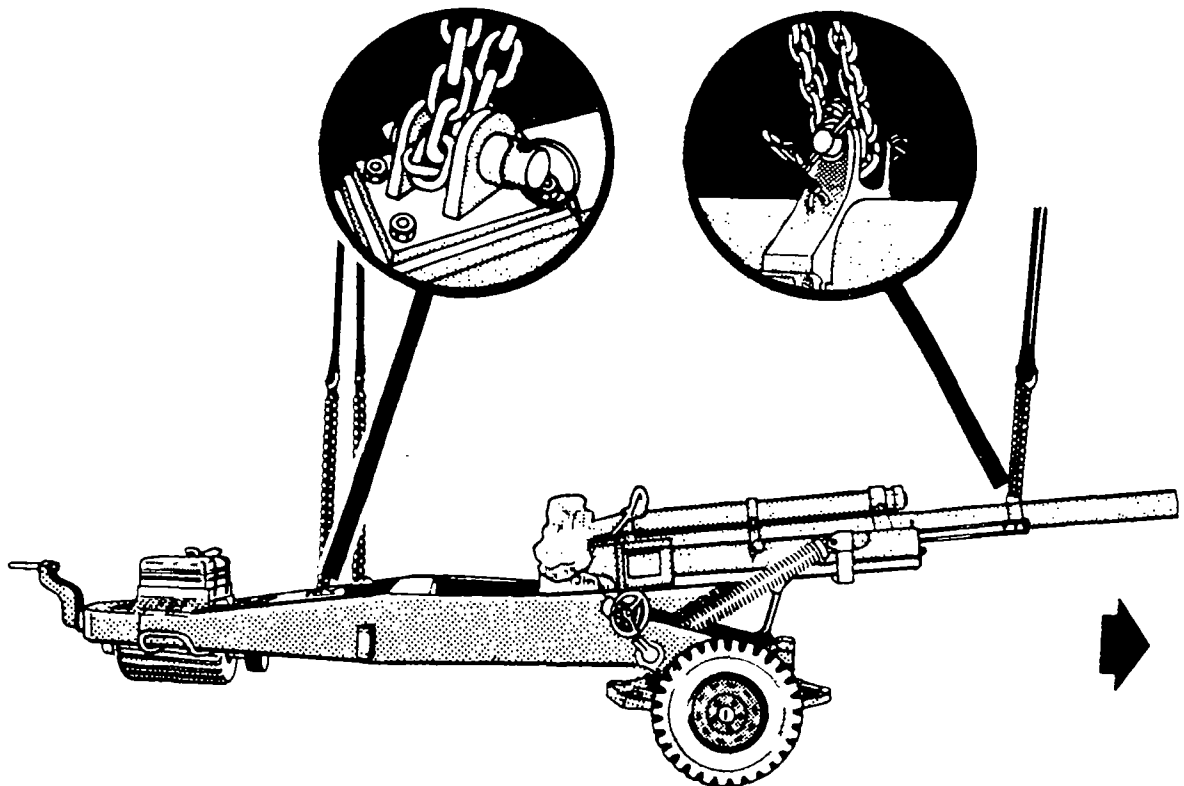


Figure 2-25. Two M102 105-mm Howitzers, with or without One, Two, or Three A-22 Cargo Bags

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47 helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Howitzer, towed, light, 105-mm, M102, LIN K57392 (2 each).
- Bag, cargo, aerial delivery, type A-22, 2,200-pound capacity (1, 2, or 3 each).
- Weight:
 - Howitzer, M102 (2 each), 6,600 pounds.
 - Howitzer, M102 (2 each) with one A-22 cargo bag, 8,860 pounds.
 - Howitzer, M102 (2 each) with two A-22 cargo bags, 11,060 pounds.
 - Howitzer, M102 (2 each) with three A-22 cargo bags, 13,260 pounds.

MATERIALS

- Two M102 howitzers:
 - Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity)
 - Sling leg assembly (2,500-pound capacity), one additional from a 10,000-pound capacity sling set.
- Two M102 howitzers with one A-22 cargo bag:
 - Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
 - Sling leg assembly (2,500-pound capacity), two additional from a 10,000-pound capacity sling set.
 - Apex fitting (10,000-pound capacity), one additional (for accompanying load).
- Two M102 howitzers with two A-22 cargo bags:
 - Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
 - Sling leg assembly (6,250-pound capacity), two additional from a 25,000-pound capacity sling set.

- Apex fitting (10,000- or 25,000-pound capacity), one additional (for accompanying load).
- Clevis assembly, medium, MS 70087-2 (4 each).
- Two M102 howitzers with three A-22 cargo bags:
 - Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
 - Sling leg assembly (6,250-pound capacity), three additional from a 25,000-pound capacity sling set.
 - Apex fitting (10,000- or 25,000-pound capacity), one additional (for accompanying load).
 - Clevis assembly, medium, MS 70087-2, (4 each).
- Tie-down strap, cargo, CGU-1/B, as required.
- Cord, nylon, Type III, 550-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cotton webbing, 1/4-inch, 80-pound breaking strength.
- Felt sheet, 24- x 60-inch (2 each) or equivalent padding.
- Energy dissipating paper honeycomb, 30- x 36-inch (1 each). (A wooden block or four sheets of felt may be substituted for the honeycomb.)
- Clevis assembly, medium, one for each A-22 cargo bag.

PERSONNEL

- Two persons can prepare and rig this load in 30 minutes.
- Add 15 minutes additional rigging time for each A-22 cargo bag.

PROCEDURES

Step 1. Preparation

- Place the two howitzers side by side approximately 18 inches apart at the wheels with the barrels facing the same direction.
- Place the honeycomb pad between the two inboard wheels. Slide both howitzers together and lash the wheels together securely with the tie-down straps.
- Wrap one sheet of felt around each inboard trail at the center of the load to prevent chafing between trails. Tie or tape padding securely. Make sure that the lift provisions are not obstructed.
- Secure all howitzer covers and loose equipment with tape or nylon cord as necessary.
- When using the 25,000-pound capacity sling set to rig the load, the chain will not fit through the trail lift provision. Remove the trail lift provision pin, place a medium clevis

assembly in the lift provision and reinstall the pin. Make sure the pin is through the bell portion of the clevis assembly and not the bolt portion.

Step 2. Rigging

NOTE: Chain link number inside the parentheses is used for the 10,000-pound capacity sling set.

- Forward sling set (2 sling legs):

- Connect two sling legs to apex fitting number 1. Position apex fitting on the ground between the barrels of the howitzers.
- Loop the chain end of the left sling leg through the lift provision on the barrel of the left howitzer and insert link 42 (60) in the grabhook. Repeat with sling leg 2 on the lift provision on the barrel of the right howitzer.
- Secure excess chain with tape or nylon cord.

- Aft sling set (3 sling legs):

- Connect three sling legs to the additional apex fitting (number 2). Position apex fitting on the two inner wheels.
- Route outer sling legs 1 and 2 to the outboard trails of the left and right howitzers respectively. Route inner sling leg 3 to the two inboard trails.
- Loop the chain end of sling leg 1 through the lift provision or the medium clevis assembly on the outboard trail of the left howitzer and insert link 3 (3) in the grabhook. Repeat with sling leg 2 on the lift provision on the outboard trail of the right howitzer.
- Loop the chain end of sling leg 3 through the lift provisions or the medium clevises located on the inboard trails of both howitzers and insert link 16 (20) in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs together on top of the howitzers to prevent entanglement during hookup and lift-off.

- Accompanying load rigging:

- Rig A-22 cargo bag according to instructions in Chapter 1.
- Wrap chain end of additional sling leg(s) around both inboard trails over the felt sheets and insert link 42 (60) in the grabhook. Chain should be as tight as possible. Secure excess chain with tape or nylon cord.

NOTE: Do not exceed the capacity of the sling legs that are rigged to the accompanying load.

- Route the other end of the sling leg assembly under the howitzer trails toward the accompanying load. Place the additional apex fitting through the sling leg(s) eyelet. Place the A-22 cargo bag medium clevis onto the apex fitting. Sling leg eyelet should

be positioned on the bell portion of the apex fitting and the clevis assemblies on the apex fitting bolt. Attach one, two, or three A-22 cargo bags in this manner.

Step 3. Hookup

The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the inner wheels and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands on the howitzer trails and places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the trails and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

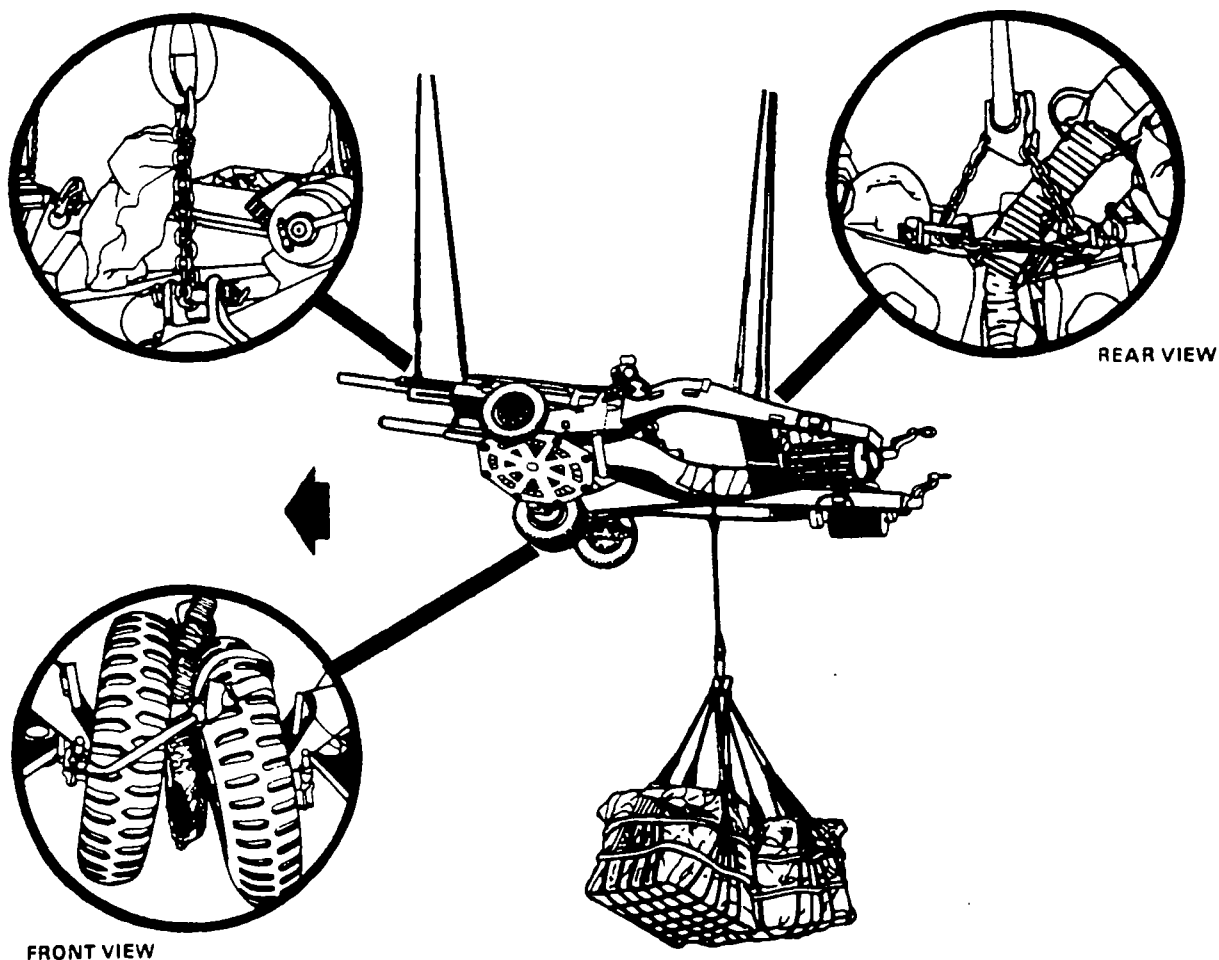


Figure 2-26. M167 20-mm AA Gun (VULCAN)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 85 knots.

LOAD DESCRIPTION

- Antiaircraft gun, towed, 20-mm, M167 (VULCAN), LIN J96845.
- Weight: 3,260 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Position radar antenna assembly to point directly upward.
- If the situation permits, place the cover on the gun and secure with nylon cord for added protection.
- Secure any loose equipment with tape or nylon cord, as required.
- Extend and secure the rear trails in the down position.
- Engage hand brakes. Install lifting shackles on tongue and trails.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the barrel.
 - Loop the chain end of the left and right sling legs through their respective lift provision on the tongue and insert link 80 in the grab link. Secure excess chain with tape or nylon cord.

- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting between the two rear trails.
 - Loop the chain end of the left and right sling legs through their respective lift provision on the lower end of each rear trail and insert link 3 in the grab link.

NOTE: If the gun cover is not used, give extra attention to make sure that the sling legs do not become entangled on the gun components.

- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the front and rear end of the gun to prevent entanglement during hookup and lift-off.

Step 3. Hookup

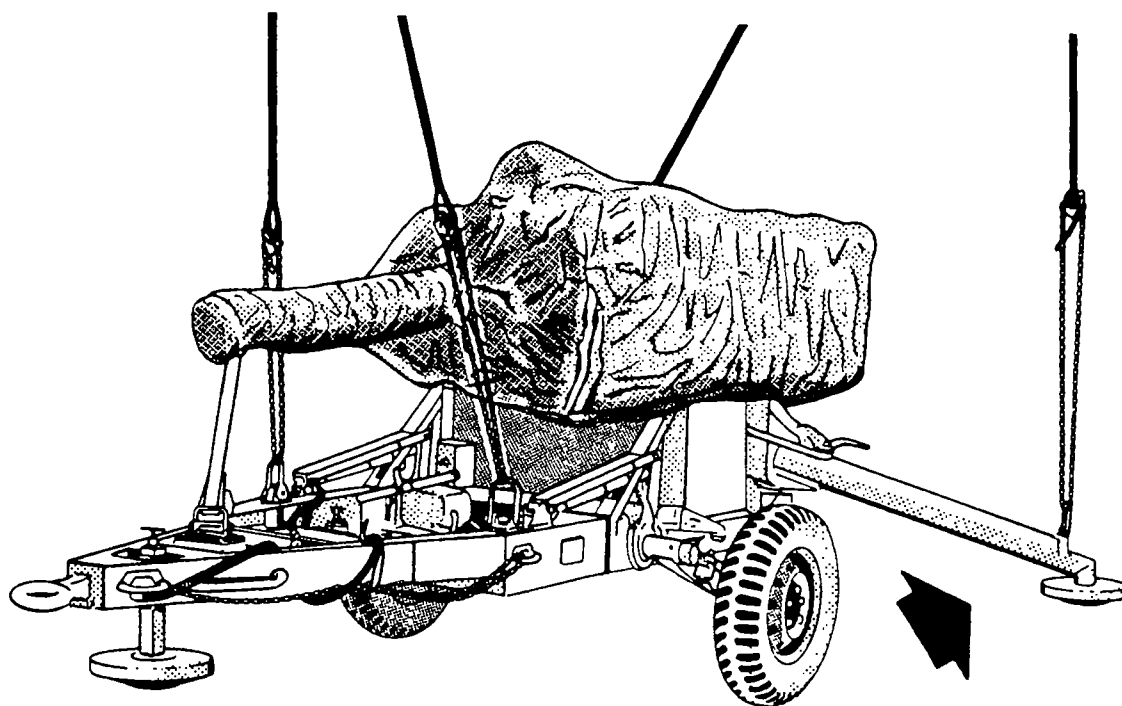
NOTE: Connect the apex fittings so the gun is carried tongue aft.

NOTE: Advise the aircraft commander to release the apex fittings on the side of the gun away from the radar antenna to prevent damage to the radar unit.

As the helicopter approaches, make sure that the cargo hook or wheels do not touch the radar antenna. The static wand person discharges the static electricity with the static wand. One hookup person stands on the tongue and places apex fitting 1 onto the aft cargo hook. The other hookup person stands on the gunner's seat or the trailer frame on the same side as the radar dish and places apex fitting 2 onto the forward cargo hook. The hookup team then carefully dismounts the gun and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-26.1. Two M101A1 Howitzers, Side by Side (USMC)**

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Howitzer, M101A1, 105-mm, side by side, TAMCN E0640 (2 each).
- Weight: 9,012 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt, or suitable substitute.
- Tie-down strap, cargo, CGU-1/B (5,000-pound capacity) as required.
- Chain, 8-foot, part number JETS-WMC-5000 (10,000-pound capacity) from a 40,000-pound sling set (2 each).
- Coupling link, part number 577-0815 (2 each).
- Energy dissipating paper honeycomb, 24- x 24-inch (2 each) or 4- x 4- x 24-inch wood (2 each).

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Position the two howitzers side by side with the barrels facing in opposite directions.
- Place the honeycomb or wood between the inboard wheel of one howitzer and the inboard trail of the other howitzer. Secure the honeycomb or wood in place with a tie-down strap. Repeat with the other tie-down strap on the inboard wheel of the other howitzer and the inboard trail.
- Close and lock the breech of each howitzer.

- Ensure the trails are properly closed and secured. Rotate the lunette downward. Secure the trail closing lock handles with tape or nylon cord.
- Remove or secure muzzle, breech, and barrel covers.
- Remove or pad the sight mounts.
- Secure loose equipment with tape or nylon cord. Place the section equipment chest on the trails and secure with tie-down straps.
- Set hand brakes.
- Wrap padding around the gun tubes above the cradle and the forward edge of the recoil damper assembly. Secure padding with tape or nylon cord.
- Wrap padding around the left and right trails of both howitzers just aft of the travel lock shaft area and secure with tape or nylon cord.

Step 2. Rigging

NOTE: The howitzer with the barrel facing in the direction of flight is designated as howitzer 1.

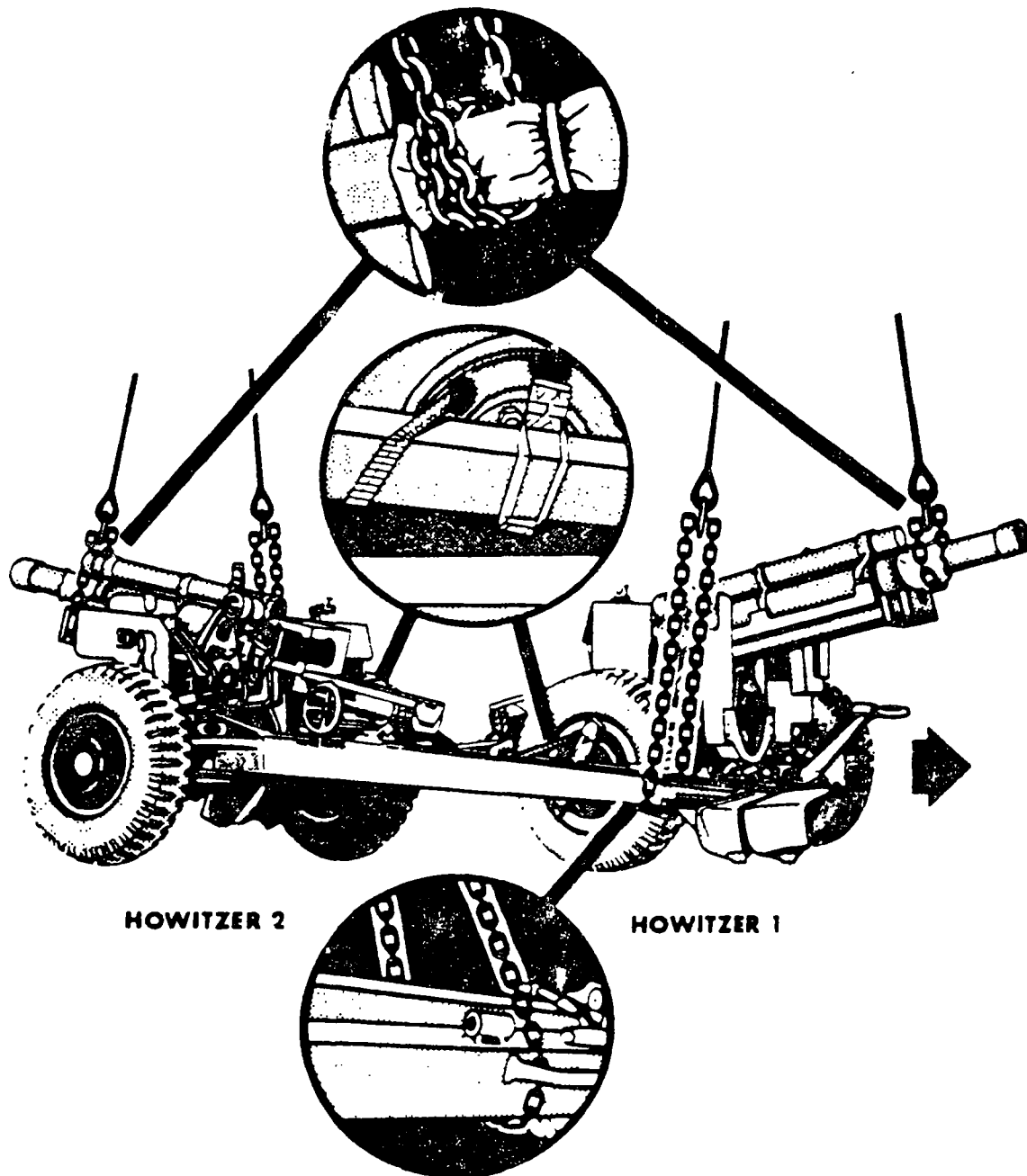
- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Using the proper coupling link, attach one additional chain length to one of the sling legs. Position the apex fitting on top of the barrel of howitzer 1.
 - Wrap the chain end of the sling leg that does not have the additional chain length once around the padding on the barrel of howitzer 1 and insert link 30 in the grab link.
 - Wrap the chain end of the other sling leg around the padding on the trail end of howitzer 2 and insert link 55 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Using the proper coupling link, attach one additional chain length to one of the sling legs. Position the apex fitting on top of the barrel of howitzer 2.
 - Wrap the chain end of the sling leg that does not have the additional chain length once around the padding on the barrel of howitzer 2 and insert link 30 in the grab link.
 - Wrap the chain end of the other sling leg around the padding on the trail end of howitzer 1 and insert link 56 in the grab link.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling leg in each sling set on top of the two howitzers to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup person (apex fitting 1) stands on the trail end of howitzer 2. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person (apex fitting 2) stands on the trail end of howitzer 1. The static wand person discharges the static electricity with the static wand. The aft hookup person places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the howitzer and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



GUIDED MISSILE SYSTEMS

*The certified dual-point rigging procedures for guided missile systems are in this section. Figures 2-27 through 2-33.1 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-27. M54A1/A2 Chaparral Launch Station

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopter at airspeeds up to and including 100 knots.

LOAD DESCRIPTION

- M54A1 launch station, Chaparral air defense system, NSN 1425-01-074-6799.
- M54A2 launch station, Chaparral air defense system, NSN 1425-01-142-4576.
- Weight: 13,000 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Prepare the launch station for external air transport according to TM 9-1425-2585-10-1.
- Rotate the missile pedestal 90 degrees from the centerline to avoid possible sling interference.

Step 2. Rigging

NOTE: The main power unit end of the platform is the front of the load for rigging purposes.

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the main power unit end of the platform.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located at the corners of the platform and insert link 3 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on the opposite end of the platform.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located at the corners of the platform and insert link 3 in the grabhook.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Brief the aircrew to hover to the side of the load and relax sling leg tension before releasing the apex fitting to prevent damage to the missile pedestal.

The hookup team stands on the back of the gunner's compartment. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. After the forward hook is connected, the aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the missile platform and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

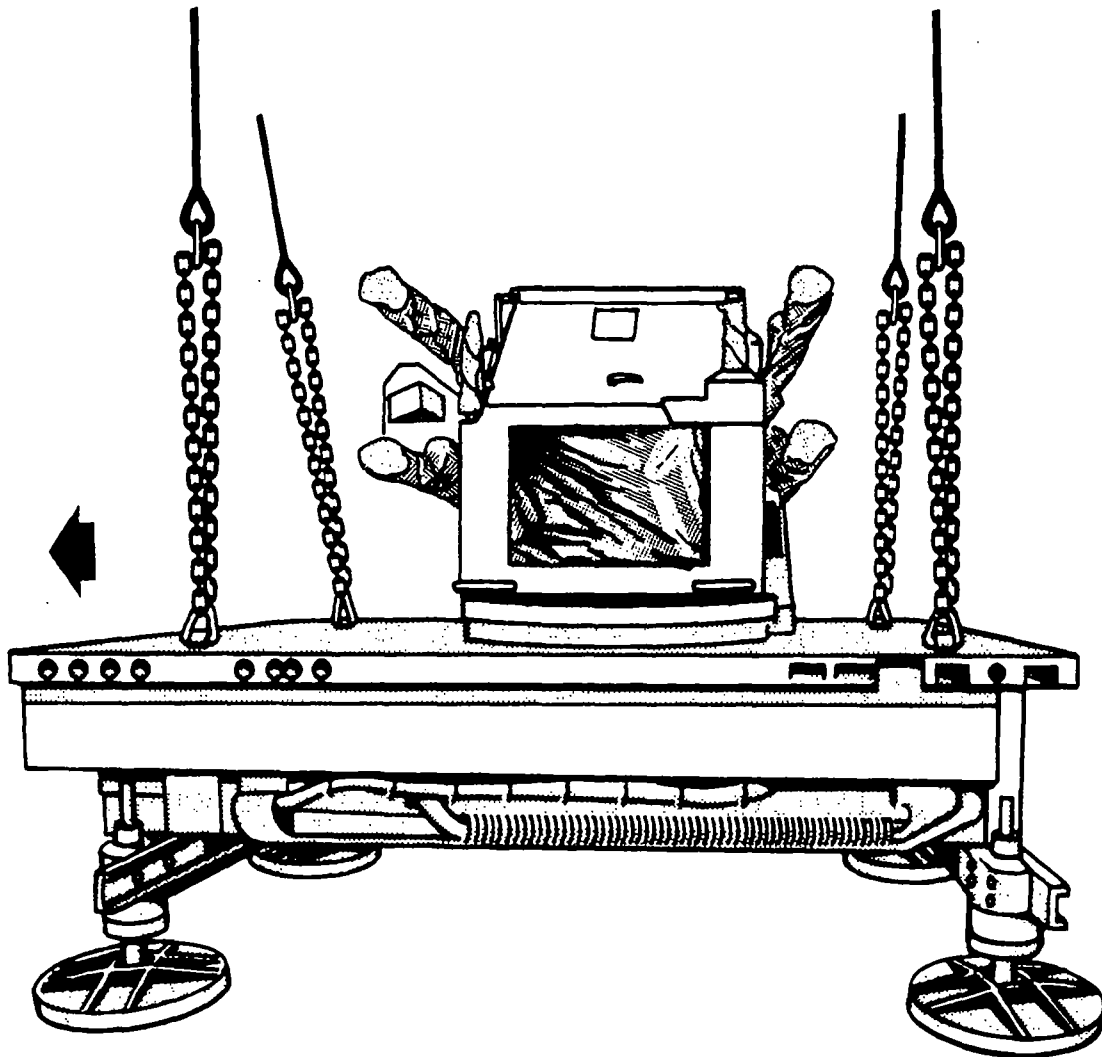


Figure 2-28. AN/MPQ-46 High-Power Illuminator Radar (HIPIR)

APPLICABILITY

This load, a component of the HAWK guided missile system, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 110 knots.

LOAD DESCRIPTION

- AN/MPQ-46 high-power illuminator radar (HIPIR), NSN 1430-01-191-8780, Phase II or Phase III, mounted on a M390C (modified) trailer chassis.
- Weight:
 - Phase II HIPIR: 9,480 pounds.
 - Phase III HIPIR: 9,290 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Pendant adapter assembly, part no. 1670EG093, NSN 1670-00-574-8049, component of aerial recovery kit (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.

PERSONNEL

Two persons can prepare and rig the load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Verify that the 3 1/4-ton clevis shackles provided initially with the M390C trailer chassis have been replaced by 6 3/4-ton clevis shackles (NSN 4030-00-278-0699). Make sure the clevis shackles are properly pinned and are not damaged.
- Prepare the HIPIR for travel in accordance to the operator's manual.
- Engage the parking brakes.
- Rotate the azimuth STOW lock clockwise until the stow pin is fully engaged with the torque tube and the antenna cannot be further moved in either direction. The antenna must face the lunette end of the trailer and be tilted slightly downward toward the ground. Secure the stow pin with tape or nylon cord to prevent it from releasing during flight.

- Remove the dust covers from the radar antennas prior to flight to prevent them from blowing off in flight.
- Install the VTG sensor unit dust cover, if applicable.
- Secure all tools and equipment inside drawers and/or cabinets. Secure all doors and drawers shut with tape or nylon cord.
- Secure all hoses, cables, and chains to the trailer chassis or surrounding structure with tape or nylon cord.
- Adjust the forward and rear leveling jacks to just above ground level so the HIPIR does not flip up during takeoff or landing.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Remove the apex fitting pin and insert the large loop of the pendant adapter in the apex fitting. Reinstall the apex fitting pin. Position the apex fitting and pendant on top of the transmitter group cabinet (trailer lunette end).
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the front corners of the trailer chassis and insert link 25 in the grabhook.
 - Pull the sling legs up and tape or tie (breakaway technique) the grabhooks to the top of the transmitter group cabinet to prevent the sling legs from becoming entangled during hookup and lift-off and also to take some of the weight off the pendant during hookup.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Add the pendant adapter to the apex fitting (refer to the forward sling set). Position the apex fitting and pendant on the radar set group cabinet.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the rear corners of the trailer chassis and insert link 3 in the grabhook.
 - Pull the sling legs up and tape or tie (breakaway technique) the grabhooks to the top of the radar set group cabinet to prevent the sling legs from becoming entangled during hookup and lift-off and also to take some of the weight off of the pendant during hookup.
 - Secure excess chain with tape or nylon cord.
 - Cluster and tie or tape (breakaway technique) sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect pendants to the cargo hooks so the lunette end is aft.

A static wand person is not required for this load because the hookup persons must place the pendant, instead of the apex fitting, on the cargo hook. When placing the pendant on the cargo hook, hold the pendant lower loop with one hand while grasping the lower end of the rigid plastic tube. Do not slam the upper loop of the pendant on the cargo hook, because that will cause the hook to rotate back and forth making hookup difficult. Simply place the pendant onto the hook ensuring that the cargo hook spring loaded keeper closes as the pendant is attached.

One hookup person stands on the radar set group cabinet and places the pendant from sling set 1 onto the forward cargo hook. The other hookup person stands on the transmitter group cabinet (lunette end) and places the pendant from sling set 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the HIPIR and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

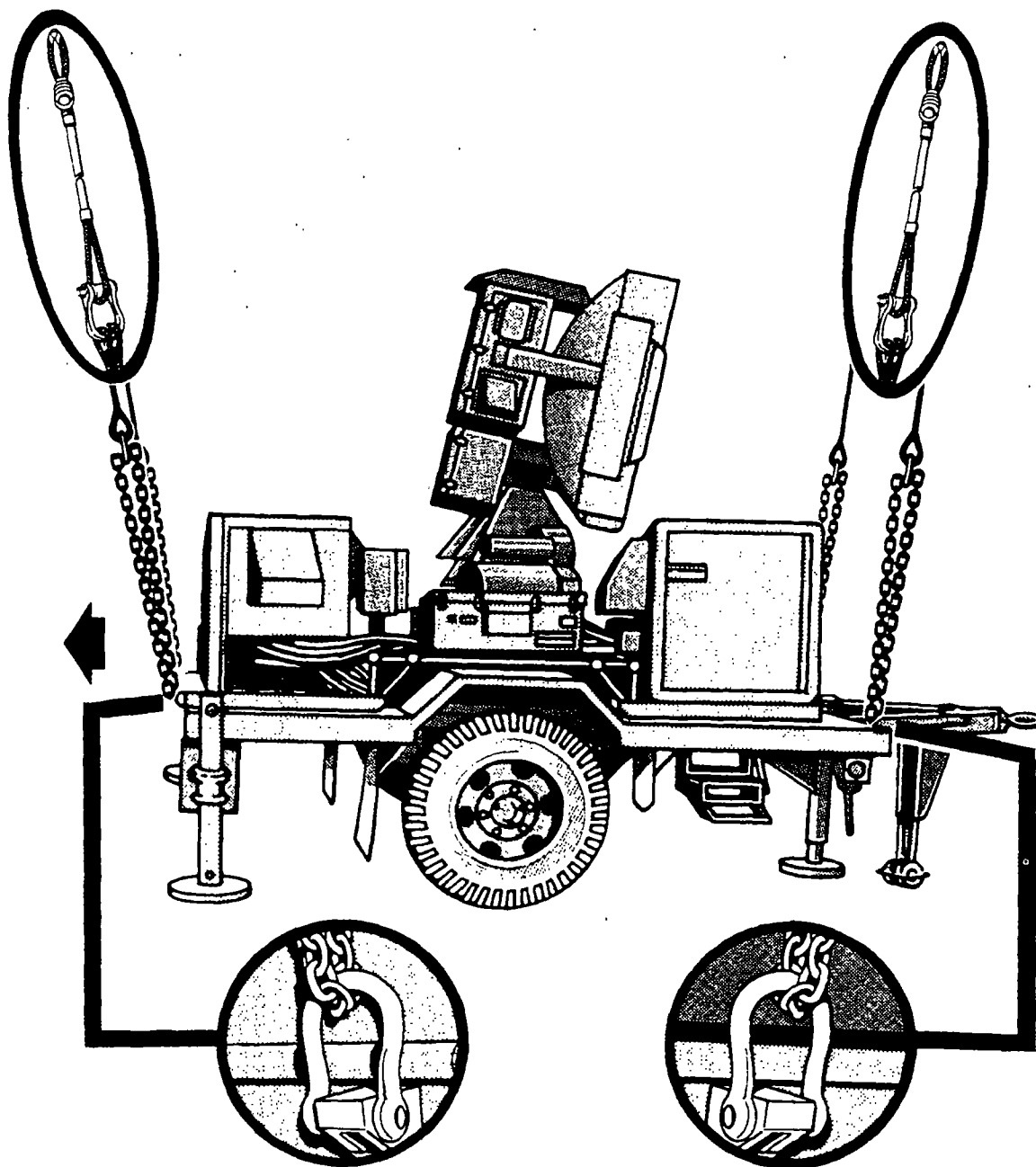


Figure 2-29. XM1E2 Loading and Storage Pallet

APPLICABILITY

The XM1E2 pallet, a component of the HAWK guided missile system and mounted on the M390C trailer with one, two, or three missiles, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120, 110, and 100 knots, respectively.

LOAD DESCRIPTION

- Guided missile pallet, loading and storage, XM1E2, NSN 1450-00-103-5399, 900 pounds.
- M390C trailer chassis, 3,770 pounds.
- Guided missile, 1,445 pounds.
- Total weight:
 - Pallet with one missile (center-mounted), 6,115 pounds.
 - Pallet with two missiles (mounted on sides), 7,560 pounds.
 - Pallet with three missiles, 9,005 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.
- Pendant adapter assembly, part no. 1670EG093, NSN 1670-00-574-8049, component of aerial recovery kit, (2 each).
- Clevis assembly, NSN 4030-00-278-0699 or equivalent, 2 each.
- Nylon, tubular, 1/2-inch, 1000-pound breaking strength.

PERSONNEL

Two persons can prepare and rig the load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Prepare the trailer, pallet, and missiles for travel according to instructions in the operator's manual.

- Make sure each missile is properly locked into the appropriate storage rack on the pallet. If only one missile is to be transported, it must be mounted on the upper center missile storage rack. If only two missiles are to be transported, they must be mounted on the two outer missile storage racks.
- Verify that the 3 1/4-ton clevis shackles provided initially with the M930C trailer chassis have been replaced by 6 3/4-ton clevis shackles (NSN 4030-00-278-0699 or equivalent). Make sure the clevis shackles are properly pinned and are not damaged.
- Engage the parking brakes.
- Adjust the forward and aft leveling jack pads to just above ground level so the trailer will not tip up during lift-off or touchdown.
- Secure all hoses, cables, and chains to the adjacent structure with tape or nylon cord.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Remove the apex fitting pin and insert the large loop of the pendant adapter in the apex fitting. Reinstall the apex fitting pin. Position the apex fitting and pendant on top of the trailer lunette.
 - Loop the chain end of the left sling leg down through the opening aft of the lunette and forward of the landing wheel leg. Pull the chain up the outside of the left side of the trailer A-frame and insert link 45 in the grabhook.
 - Repeat the above procedure using the right sling leg and pulling the chain up the outside of the right side of the trailer A-frame. Insert link 45 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Remove the apex fitting pin and insert the large loop of the pendant adapter in the apex fitting. Reinstall the apex fitting pin. Position the apex fitting and pendant on top of the center missile position.
 - Route the left sling leg between the center missile and the left missile. Loop the chain end through the lift provision located on the left rear corner of the trailer above the left taillight and insert link 30 in the grabhook.
 - Route the right sling leg between the center missile and the right missile. Loop the chain end through the lift provision located on the right rear corner of the trailer above the right taillight and insert link 30 in the grabhook.
 - The 16-foot length of tubular nylon is used to prevent the two rear sling legs from interfering with the two outer missiles. Route one end of the tubular nylon through the potted eye of one of the sling legs. Route the same end of the tubular nylon through the potted eye of the other sling leg. Position the potted eyes of the two sling legs 32 inches apart so the sling legs cannot contact the two outer launch missiles or the center missile. Using the remainder of the tubular nylon, repeat the procedure until there are at least five lengths of nylon (2 1/2 complete wraps) between the potted eyes on the two sling legs. Tie the two ends together with a square knot and secure each free end with an overhand knot or half hitch.

NOTE: Do not route the tubular nylon between the chains or grabhooks. Failure to attach the tubular nylon between the sling leg potted eyes may result in damage to the missiles or failure of the load.

- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in the forward sling set together approximately every 3 feet above the lunette to prevent entanglement during hookup and lift-off. Cluster and tie or tape (breakaway technique) the sling legs in the aft sling set together above the center missile to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect pendants to the cargo hooks so the trailer lunette is aft and the missiles face the direction of flight.

A static wand person is not required for this load because the hookup persons must place the pendant, instead of the apex fitting, on the cargo hook. When placing the pendant on the cargo hook, hold the pendant lower loop with one hand while grasping the lower end of the rigid plastic tube. Do not slam the upper loop of the pendant on the cargo hook, which will cause the hook to rotate back and forth making hookup difficult. Simply place the pendant onto the hook ensuring that the cargo hook springloaded keeper closes as the pendant is attached.

One hookup person stands on the aft end of the trailer and places the pendant from sling set 2 onto the forward cargo hook. The other hookup person stands on the lunette end of the trailer and places the pendant from sling set 1 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the trailer and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

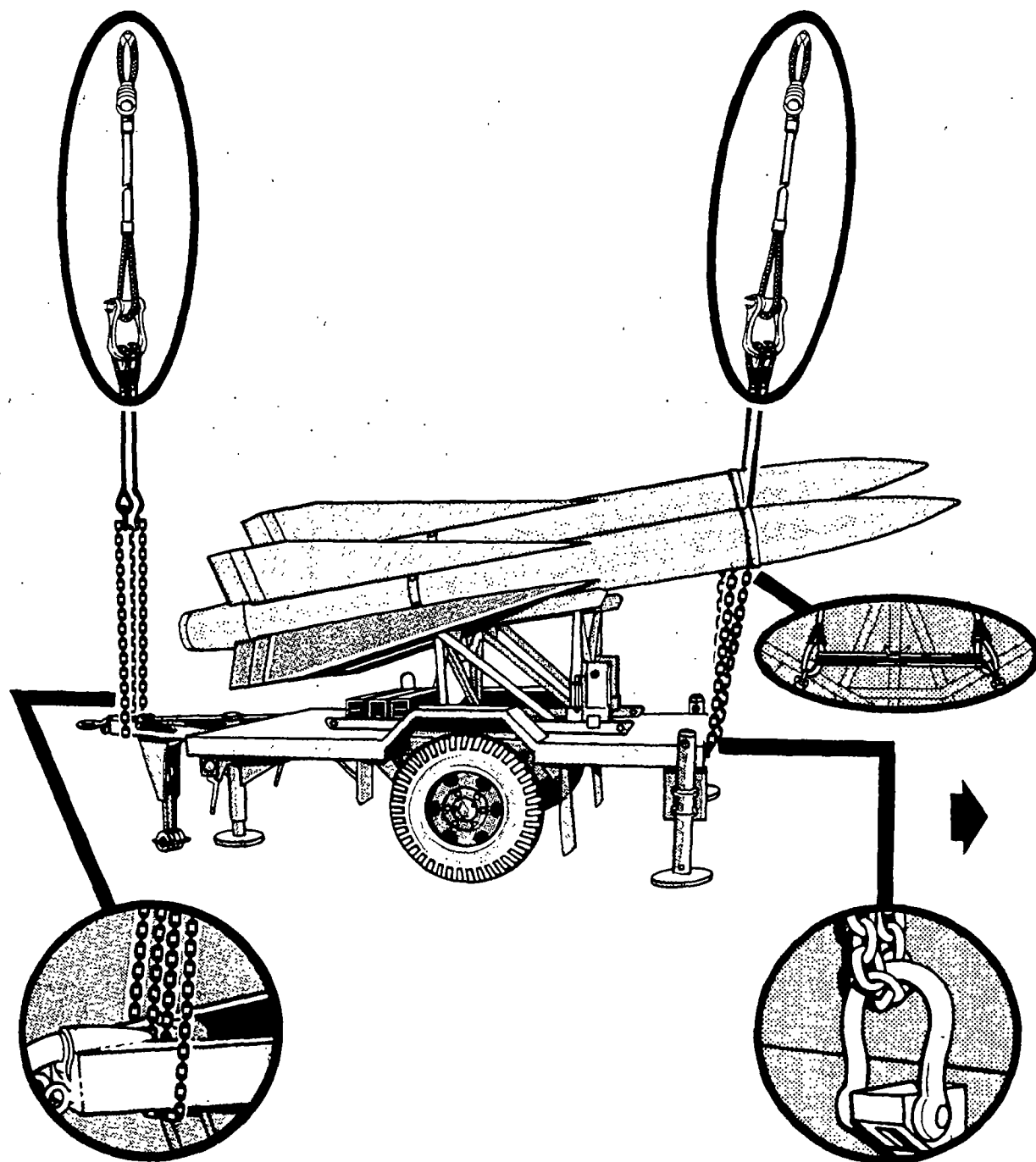


Figure 2-30. Platoon Support Van/Maintenance Center

APPLICABILITY

This load, a component of the HAWK guided missile system, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Platoon support van/maintenance center (PSV/MC), M32 van.
- Weight: 14,300 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.

PERSONNEL

Four persons can prepare and rig the load in 60 minutes.

PROCEDURES

Step 1. Preparation

- Prepare the PSV/MC M32 van for air travel according to the operator's manual.
- Secure all loose equipment inside the shelter with nylon cord or tape.
- Close and secure all hatches and vents. Secure door in the closed/locked position.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the environmental control unit (ECU) compartment end of the M32 van.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the front corners of the van and insert link 8 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on the aft end of the van roof.

- Loop the chain end of the left and right sling legs through their respective lift provisions located on the rear corners of the van and insert link 46 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together on top of the van roof to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings to the cargo hooks so the ECU end of the van is forward.

The hookup team stands on the van roof. The static wand person discharges the static electricity with the static wand. The forward hookup person (ECU end) places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the van and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

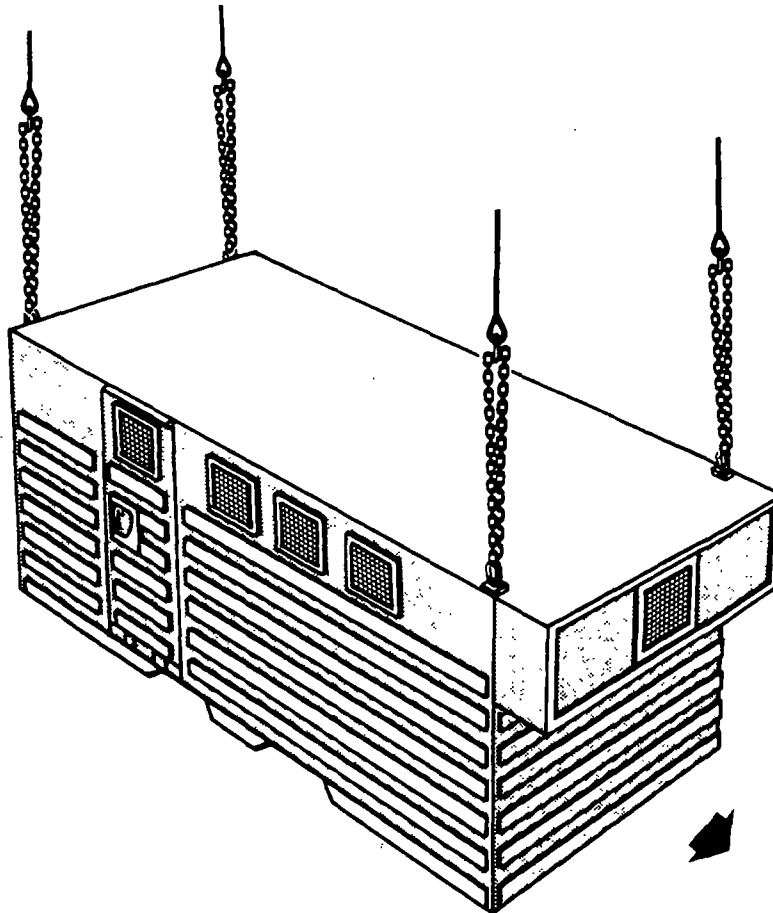


Figure 2-31. Field Maintenance Equipment Shop 20 Electromechanical Shop

APPLICABILITY

This load, a component of the HAWK guided missile system, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Field maintenance equipment (FME) shop 20 electromechanical shop.
- Weight: 5,312 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.

PERSONNEL

Four persons can prepare and rig the load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Prepare the FME shop 20 shelter for air travel according to the operator's manual.
- Secure all loose equipment inside the shelter with nylon cord or tape.
- Close and secure all hatches and vents. Secure door in the closed/locked position.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the end of the shelter that is opposite the environmental control unit (ECU) compartment end.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the front corners of the shelter and insert link 75 in the grabhook.

- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on the aft (ECU) end of the shelter.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the rear corners of the shelter and insert link 75 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together on top of the shelter to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings to the cargo hooks so the ECU end of the shelter is aft.

The hookup team stands on the shelter. The static wand person discharges the static electricity with the static wand. One hookup person places apex fitting 1 onto the forward cargo hook. The other hookup person (ECU end) places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the shelter and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

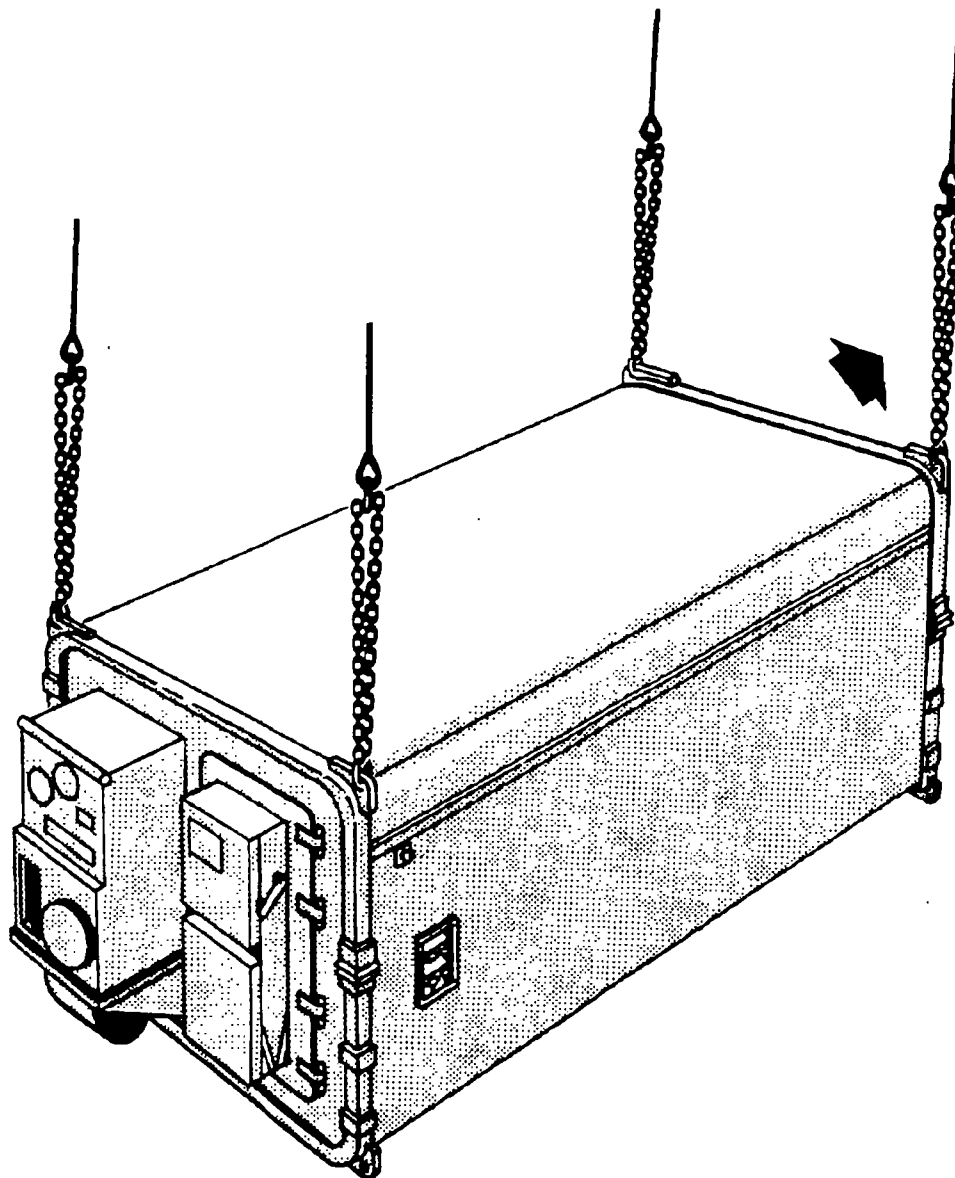


Figure 2-32. Field Maintenance Equipment Shop 21 Unmanned Shop Electrical Equipment

APPLICABILITY

This load, a component of the HAWK guided missile system, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Field maintenance equipment (FME) shop 21 unmanned shop electrical equipment.
- Weight: 5,639 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.

PERSONNEL

Four persons can prepare and rig the load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Prepare the FME shop 21 shelter for air travel according to the operator's manual.
- Secure all loose equipment inside the shelter with nylon cord or tape.
- Close and secure all hatches and vents. Secure door in the closed/locked position.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the end of the shelter that is opposite the door end.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the front corners of the shelter and insert link 5 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on the aft (door) end of the shelter.

- Loop the chain end of the left and right sling legs through their respective lift provisions located on the rear corners of the shelter and insert link 28 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together on top of the shelter to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings to the cargo hooks so the door end of the shelter is aft.

The hookup team stands on the shelter. The static wand person discharges the static electricity with the static wand. One hookup person places apex fitting 1 onto the forward cargo hook. The other hookup person (door end) places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the shelter and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

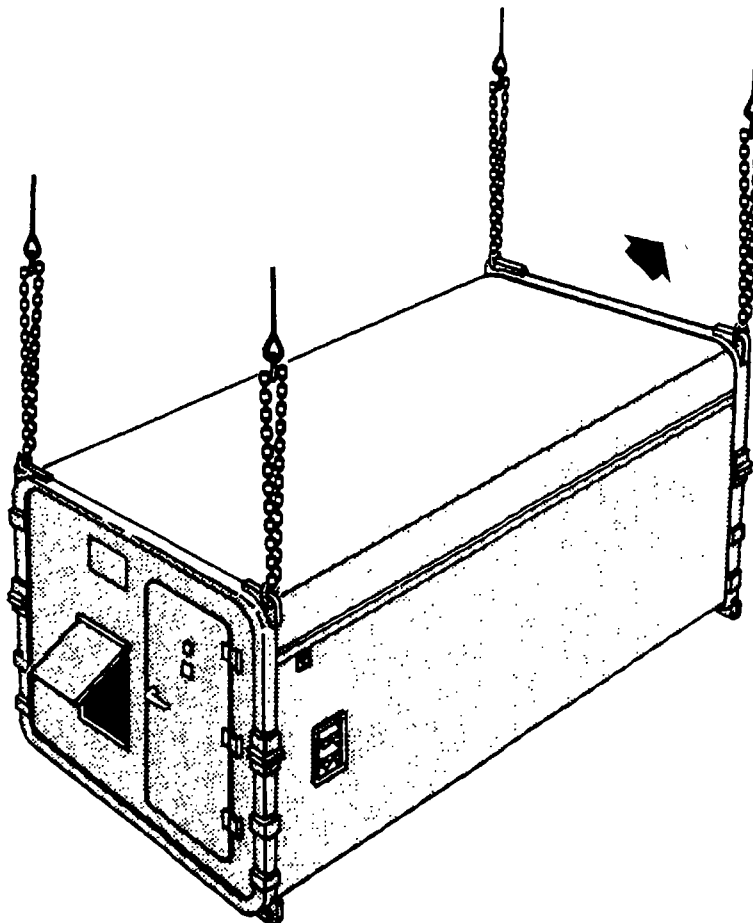


Figure 2-33. Platoon Command Post/Battery Command Post

APPLICABILITY

This load, a component of the HAWK guided missile system when rigged with the required modified sling sets and equipment, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 125 knots.

LOAD DESCRIPTION

- Platoon command post, guided missile AN/MSW-20 (PCP), Phase II and/or Phase III, NSN 1430-01-180-5318, mounted on a M390C (modified) trailer chassis.
- Battery command post, guided missile AN/MSW-21 (BCP), Phase III, NSN 1430-01-181-5884, mounted on a M390C (modified) trailer chassis.
- Weight:
 - Phase II PCP: 10,244 pounds.
 - Phase III PCP: 9,300 pounds.
 - Phase III BCP: 9,980 pounds.

MATERIALS

NOTE: Do not substitute any sling equipment in place of the specified sling set or multiloop lines. The two multiloop lines and the sling set, with the additional apex fitting, chain sections, and additional coupling links, are to be stored in the kit bag and only used to EAT the PCP/BCP.

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity), two additional chain sections, 8-foot long (part no. 38850-00053-102) (6,250-pound capacity), and two additional coupling links (part no. 664-241).
- Line, multiloop, 12-foot, 4-loop, 8-ply (NSN 1670-01-062-6307) (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, nylon, tubular, 1/2-inch, 1,000-pound breaking strength.

PERSONNEL

Two persons can prepare and rig the load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Verify that the 3 1/4-ton clevis shackles provided initially with the M390C trailer chassis have been replaced by 6 3/4-ton clevis shackles (NSN 4030-00-278-0699). Make sure the clevis shackles are properly pinned and are not damaged.
- Prepare the BCP/PCP for travel according to the operator's manual.
- Engage the parking brakes.
- Rotate and adjust the leveling jacks so that they are vertically aligned and just clear of the ground. Lock into position.
- Tape over the towing provisions on the bottom corners of the shelter to prevent the rigging crew from routing the sling leg chain ends through the towing provisions.
- Using the 1/2-inch tubular nylon, tie the front and rear lifting rings together tightly on top of the left side of the shelter so that the lifting rings are facing each other. Repeat with the top lifting rings on the right side of the shelter.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Using the coupling links, add the 8-foot chain extensions to the two sling legs. Position the apex fitting on top of the lunette end of the shelter roof.
 - Route the chain end of the left sling leg down through the upper lifting ring on the top left corner of the shelter, through the trailer lifting provision located on the front left corner of the trailer chassis, and back up through the upper lifting ring on the top left corner of the shelter. Insert link 3 in the grabhook. Repeat with the other sling leg on the right front lifting provisions.

NOTE: Do not route the chain ends through the towing provision on the base of the shelter.

- Tape or tie (breakaway technique) the sling legs to the top of the shelter to ensure that the sling legs do not become entangled on any of the obstructions on the shelter roof.
- Aft sling set (2 sling legs):
 - Using one of the 12-foot multiloop lines, make a choker hitch around the rear left leveling jack stand on the trailer chassis. Make sure the loop of the knot is facing to the rear of the trailer. Route the free end of the 12-foot multiloop line up through the lifting ring on the top left corner of the shelter.

NOTE: Do not route the 12-foot multiloop line through the towing provision on the base of the shelter.

- Make sure the choker hitch is tight around the jack stand and the individual plies of the multiloop line remain aligned. Tape or tie the multiloop line as necessary.

- Using the other 12-foot multiloop line, repeat the two previous steps on the right rear corner of the shelter.
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the IFF end of the shelter.
 - Loop the chain end of the left sling leg through the open loop at the free end of the 12-foot multiloop line on the left rear corner of the shelter. Insert link 70 in the grabhook. Repeat with the right sling leg and the 12-foot multiloop line on the right rear corner.
 - Tape or tie (breakaway technique) the sling legs to the top of the shelter or surrounding structure to ensure that the sling legs do not become entangled on any of the obstructions on the shelter roof.
- Secure excess chain with tape or nylon cord.
 - Cluster and tie or tape (breakaway technique) sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

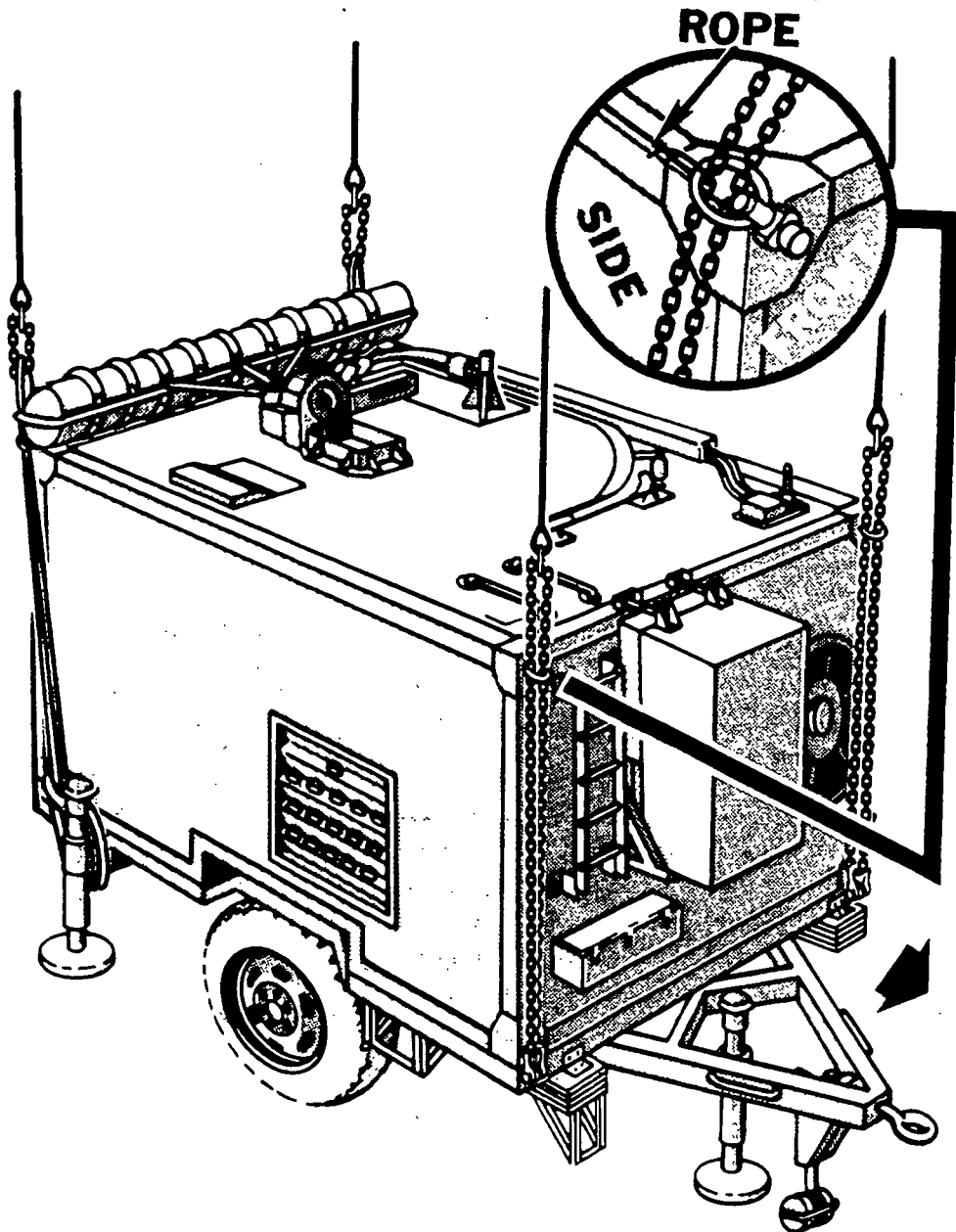
NOTE: Connect the apex fittings to the cargo hooks so the lunette end of the trailer is forward.

The hookup team stands on the shelter roof. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the shelter and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

NOTE: Do not remove the additional chain sections from sling set 1. Keep sling set 1 and 2 intact for ease in future use. Store the two 12-foot multiloop lines in the storage bag along with the two sling sets.

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-33.1. Pedestal-Mounted Stinger (Avenger)**

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47 and CH-53 helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Pedestal-mounted stinger (Avenger), NSN 1430-01-286-1314.
- Weight: 8,513 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity) (CH-47D) or
- Multileg sling set (15,000-pound capacity) (2 each) or sling set (40,000 pound capacity) with one additional apex fitting (40,000-pound capacity) (CH-53E).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Fold mirrors forward in front of the windshield for added protection and tie together using nylon cord.
- Ensure that the Avenger fire unit is properly secured to the truck. Secure all equipment inside the fire unit with tape, nylon cord, or lashing; close and secure the hatch.
- Disconnect the standard vehicle-mounted launcher connectors from the missile pods and secure them to the fire unit with tape or nylon cord.
- Secure all other equipment inside the vehicle with tape, nylon cord, or lashing. Secure doors shut (if installed).
- Ensure that the fuel tank is not over 3/4 full. Inspect fuel tank cap, oil filler cap, and battery caps for proper installation.

- Engage the vehicle parking brake and put the transmission in neutral.
- Ensure that the truck front wheels are pointed straight ahead. Tie down the steering wheel using the securing device attached under the dashboard.

Step 2. Rigging

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

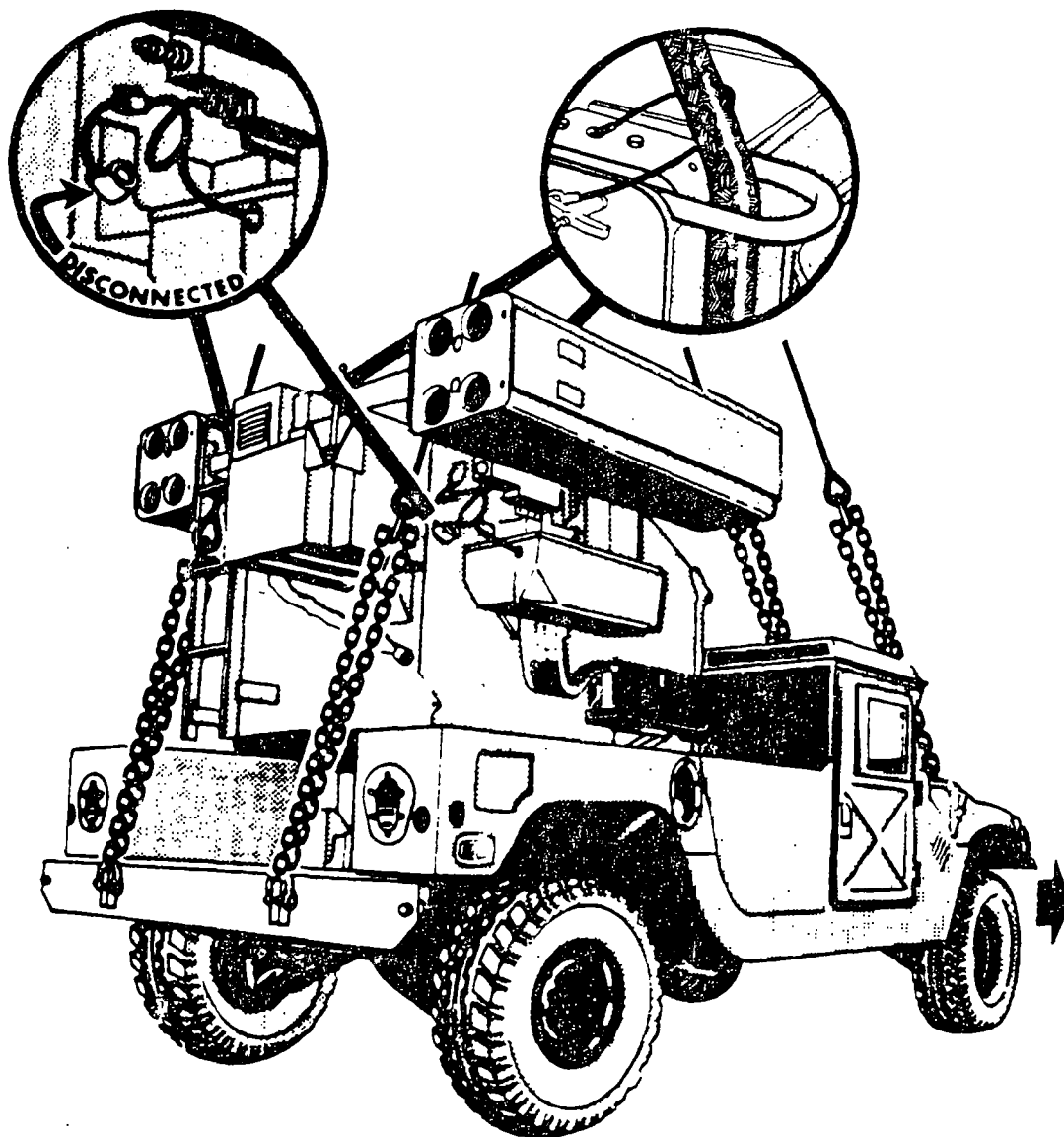
- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting/web ring on top of the fire unit.
 - Loop the chain end of the left and right sling legs through their respective lift provision that protrudes through the hood and insert link 50 (10,000-pound sling set), link 40 (15,000-pound sling sets, or link 32 (40,000-pound sling set) in the grabhook/grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting/web ring on top of the fire unit.
 - Loop the chain end of the left and right sling legs through their respective lift provision located on the rear bumper and insert link 5 (10,000- and 15,000-pound sling set) or link 4 (40,000-pound sling set) in the grabhook/grab link. DO NOT place the sling leg in the sling guide on top of the fire unit.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the fire unit to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup person (apex fitting 1) stands on top of the fire unit. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person (apex fitting 2) stands on top of the fire unit. The static wand person discharges the static electricity with the static wand. The aft hookup person places apex fitting 2 onto the aft cargo hook. DO NOT use the center cargo hook. The hookup team then carefully dismounts the vehicle and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.





ENGINEER EQUIPMENT

The certified dual-point rigging procedures for engineer equipment are in this section. Figures 2-34 through 2-56 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-34. D5B Tractor Dozer, Sectionalized

APPLICABILITY

The D5B tractor power section and track section are certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 100 and 110 knots, respectively.

LOAD DESCRIPTION

- D5B tractor, dozer, Type II, sectionalized, LIN W76268.
- Weight:
 - Power section without ROPS, 18,915 pounds.
 - Track section, 13,735 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity) (1 per section).
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.

PERSONNEL

- Four men can sectionalize the dozer in 2 1/2 hours.
- Two men can prepare and rig each load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Sectionalize the dozer according to the operator's manual. Do not remove winch and winch pump.
- Remove the exhaust stack and secure on top of the winch with nylon cord.
- Remove pre-air cleaner and secure on seat with nylon cord.

- Tape over lights and gages to prevent breakage.
- Secure seat with nylon cord.

Step 2. Rigging

- Power section:
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the fuel tank.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on each side of the fuel tank and insert link 8 in the grabhook.
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the engine compartment.
 - Loop the chain end of the left and right sling legs through their respective lift provisions on the front corners and insert link 57 in the grabhook.
 - Secure excess chain with tape or nylon cord.
 - Cluster and tie or tape (breakaway technique) the sling legs in each sling set to prevent entanglement during hookup and lift-off.
- Track section:
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the forward (blade) end.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located in front of the forward wheel and insert link 12 in the grabhook.
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the rear end.
 - Loop the chain end of the left and right sling legs through their respective lifting provisions located near the aft end of the track and insert link 21 in the grabhook.
 - Secure excess chain with tape or nylon cord.
 - Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the track section to prevent entanglement during hookup and lift-off.

Step 3. Hookup

- Power section:

NOTE: Connect the apex fittings so that the power section is carried rear end forward.

- The static wand person discharges the static electricity with the static wand. One hookup person stands on the driver's seat and places apex fitting 1 onto the forward cargo hook. The other hookup person stands on top of the engine compartment and places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook.

- Track section:

NOTE: Connect the apex fittings so that the track section is carried blade forward.

- The static wand person discharges the static electricity with the static wand. One hookup person stands on the front end and places apex fitting 1 onto the forward cargo hook. The other hookup person stands on the rear end and places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook.
- Hookup teams then carefully dismount their respective sections and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

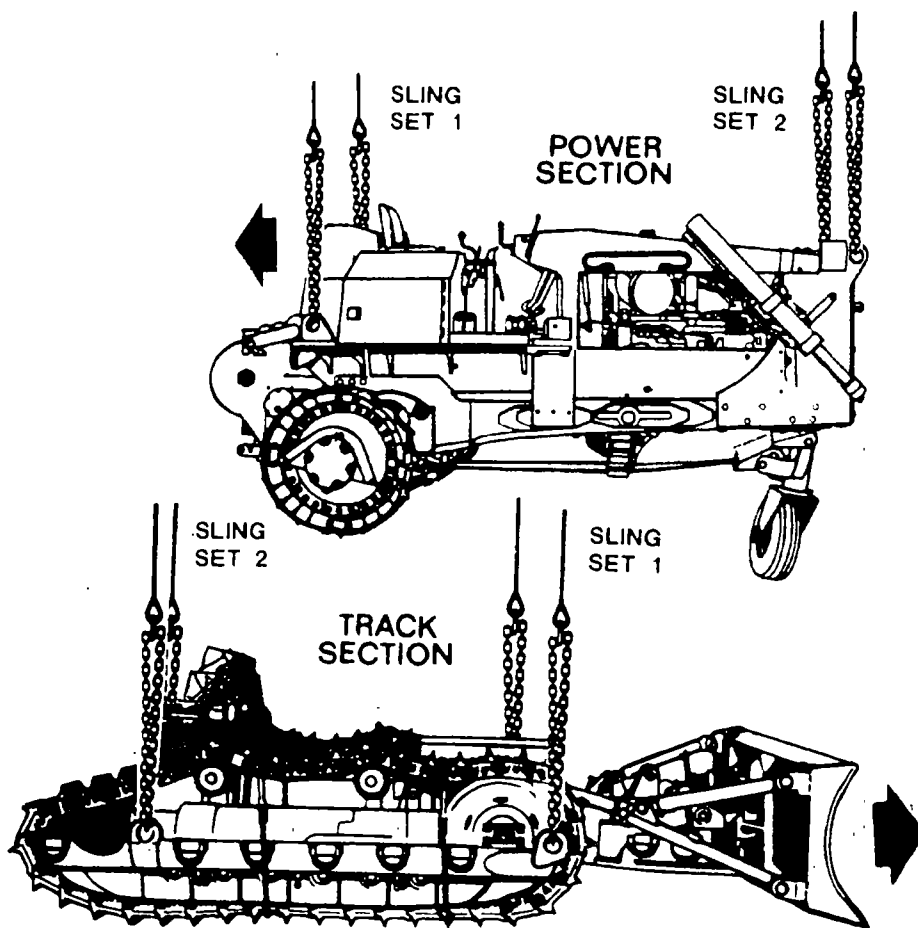


Figure 2-35. Tractor, Full-Track, Case Model 1150

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 110 knots.

LOAD DESCRIPTION

- Tractor, full-tracked, with multipurpose bucket, case model 1150, TAMCN B2463, NSN 3806-00-140-2427.
- Weight: 27,000 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt or suitable substitute.
- Chain, 8-foot, part no. JETS-WMC-5000 (10,000-pound capacity) from a 40,000-pound capacity sling set (4 each).
- Coupling link, part no. 577-0815 (4 each).

PERSONNEL

Two persons can prepare and rig this load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Raise the bucket 2 to 3 feet off the ground.
- Tape over lights, air filter intake, and exhaust pipe opening.
- Make sure the winch line is reeled all the way in.
- Engage the hand brake and place the transmission in neutral.

Step 2. Rigging

NOTE: The additional chain section is added after each sling leg chain is looped through the lift provision because the coupling link will not fit through the opening in the lift provision.

- Forward sling set (two sling legs):
 - Connect two sling leg assemblies to apex fitting number 1.
 - Position the apex fitting on top of the engine compartment. Loop the chain end of the left and right sling legs through their respective lift provisions mounted aft of the front idler. Using the coupling link, add the additional chain section to the sling leg chain assembly. Insert link 8 in the grab link.
- Aft sling set (two sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting on top of the ROPS. Loop the chain end of the left and right sling legs through their respective lift provisions mounted forward of the aft drive sprockets. Using the coupling link, add the additional chain section to the sling leg chain assembly. Insert link 16 in the grab link.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the tractor to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the engine deck. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the ROPS. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount from the tractor and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

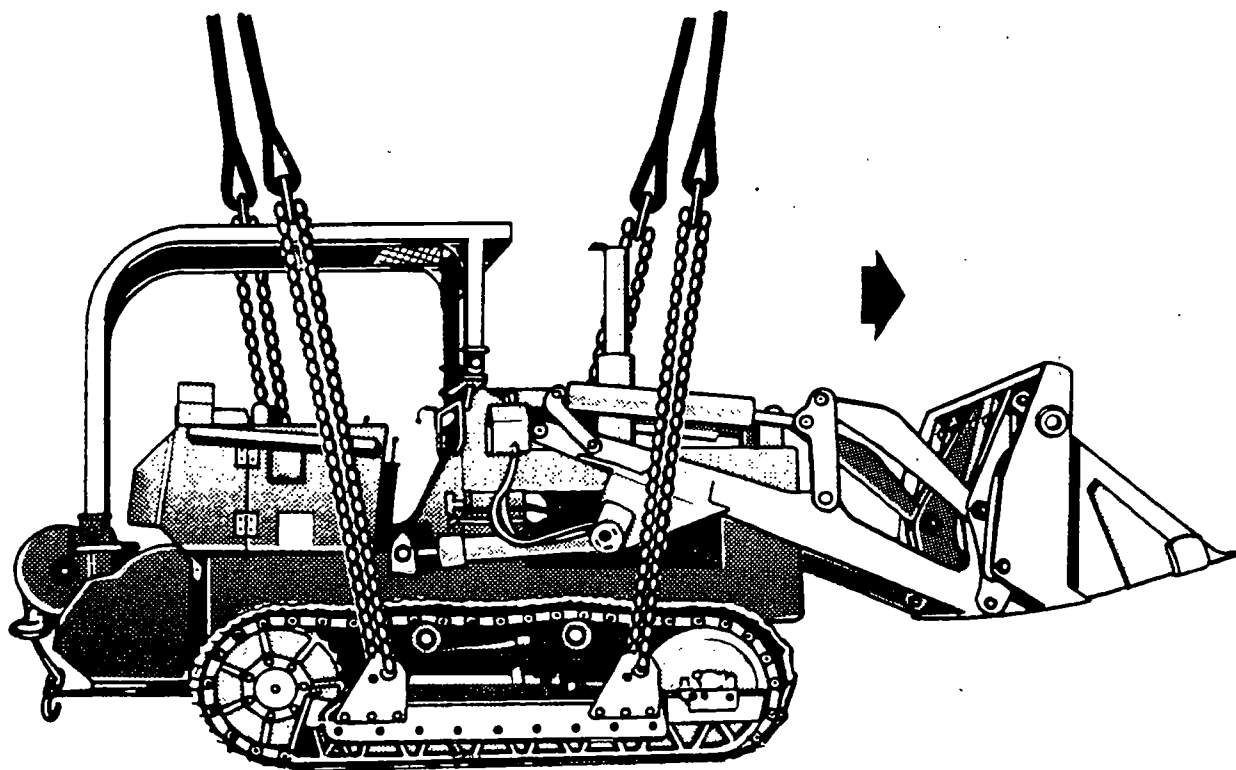


Figure 2-36. Tractor, Full-Track, Case Model 1150E

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 75 knots.

LOAD DESCRIPTION

- Tractor, full-tracked, case model 1150E, TAMCN B2460, NSN 2410-01-254-1667.
- Weight: 24,062 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt or suitable substitute.
- Chain, 8-foot, part no. JETS-WMC-5000 (10,000-pound capacity) from a 40,000-pound capacity sling set (2 each).
- Coupling link, part no. 577-0815 (2 each).
- Tie-down assembly, chain, MB-1 (10,000-pound capacity).

PERSONNEL

Two persons can prepare and rig this load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Raise the blade 2 feet off the ground. Using the tie-down chain, secure the blade in the UP position to prevent the blade from creeping down.
- Twist the lights on the cab inward. Tape over the lights, glass fixtures, and exhaust pipe opening.
- Make sure that all caps, lids, and hatches are securely fastened.
- Engage the hand brake and place the transmission in neutral.
- Secure all lids, caps, and hatches closed with tape or nylon cord.

Step 2. Rigging

NOTE: This load is rigged to fly blade forward.

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1.
 - Position the apex fitting on top of the engine deck. Loop the chain end of the left and right sling legs through their respective lift provisions on the front end of the engine deck. Insert link 5 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting on top of the cab. Loop the chain end of the left and right sling legs through their respective lift provisions mounted near the base of the cab. Using the coupling link, add the additional chain section to the sling leg chain assembly. Insert link 50 in the grab link. Add the additional chain section after the sling leg chain is looped through the lift provision because the coupling link will not fit through the opening in the lift provision. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the tractor to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the front end of the engine deck. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the aft end of the engine deck or the cab. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the tractor and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

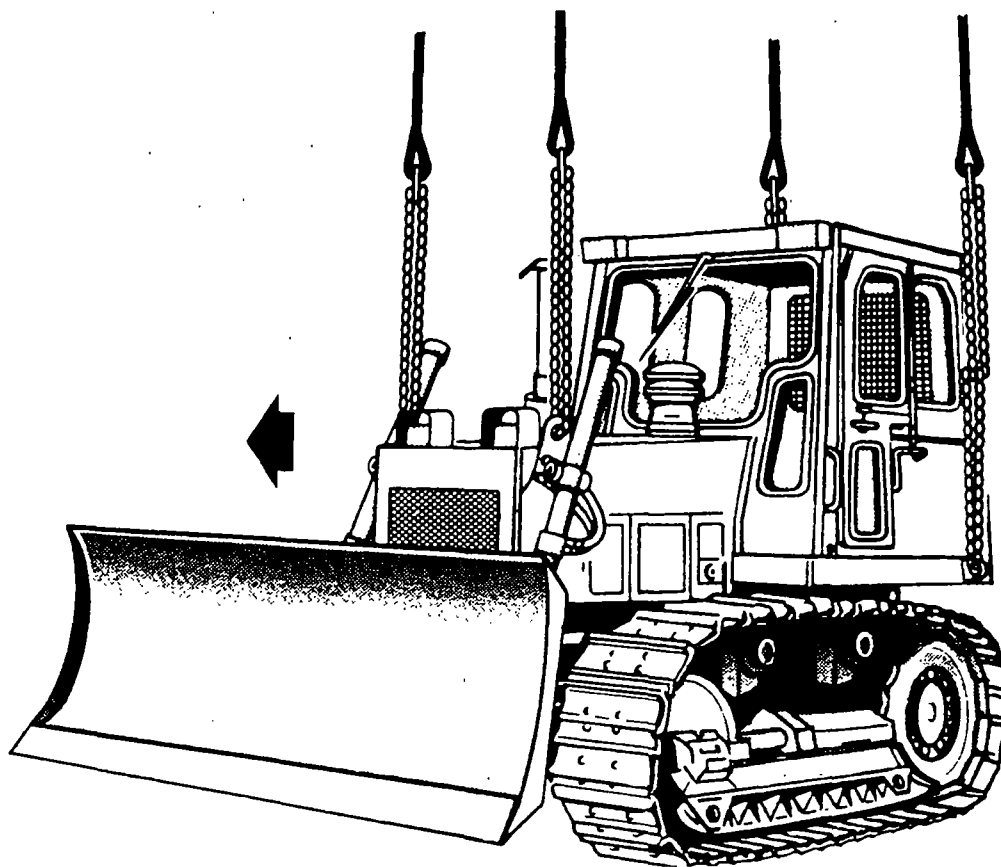


Figure 2-37. Tractor, Wheeled, Industrial, Case Model 580

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 110 knots.

LOAD DESCRIPTION

- Tractor, rough terrain (RT), wheeled, industrial, case model 580, TAMCN B2467, NSN 2420-00-156-4583.
- Weight: 10,000 pounds.

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each) with two 6-foot chain extensions and two coupling links, or
- Sling set (40,000-pound capacity), with one additional apex fitting (40,000-pound capacity), with two 8-foot chain extensions and two coupling links (part no. 577-0815).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (5,000-pound capacity) (2 each).

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Elevate front bucket halfway and tilt bucket toward the rear.
- Position rear backhoe arm with bucket in the UP position and secure with tie-down straps to prevent the backhoe arm from swinging freely. Route the straps from each stabilizer to the backhoe arm.
- Tape all lights and glass fixtures, and tape exhaust pipe shut.
- Ensure that all caps, lids, and hatches are securely fastened.
- Engage hand brake and place transmission in neutral.

Step 2. Rigging

NOTE: This load is rigged to fly large bucket forward.

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outerload-carrying sling legs.

NOTE: Chain link number inside parentheses is used for the 40,000-pound capacity sling set.

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1. Using the proper connecting link, add the chain extensions to the two sling legs.
 - Position the web ring/apex fitting on top of the engine deck. Loop the chain end of the left and right sling legs through their respective lift provisions located on the front corners of the engine hood and insert link 37 (37) in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the web ring/apex fitting on top of the ROPS. Loop the chain end of the left and right sling legs through their respective lift provisions located on the rear corners of the ROPS and insert link 59 (45) in the grab link.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the tractor to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on top of the engine deck. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on top of the engine deck or the ROPS. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount from the tractor and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

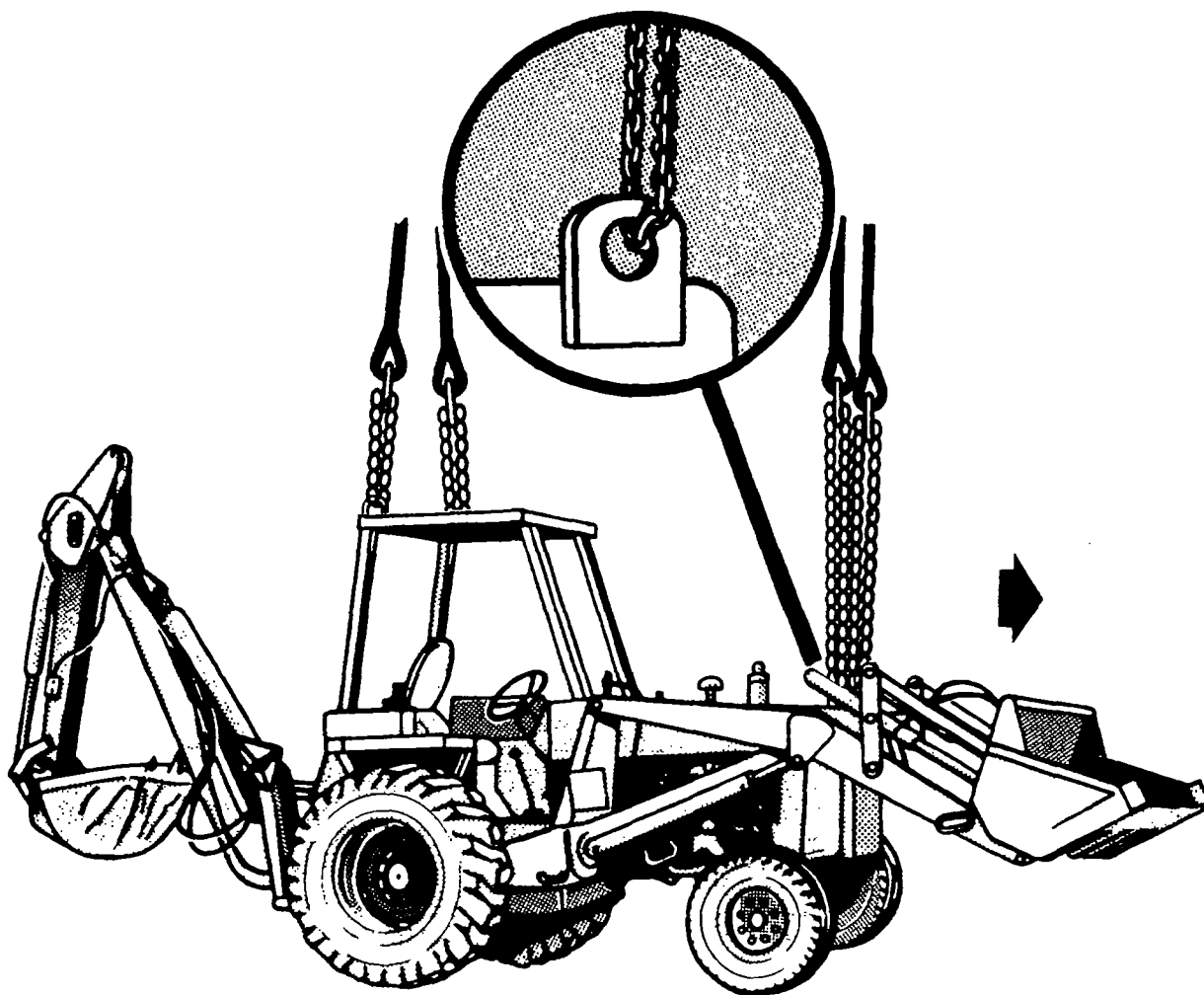


Figure 2-38. Small Emplacement Excavator (SEE)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D and CH-53E helicopters at airspeeds up to and including 100 and 125 knots, respectively.

LOAD DESCRIPTION

- Small emplacement excavator (SEE), LIN T34437 or TAMCN B2482, NSN 2420-01-160-2754.
- Weight: 16,240 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity) (CH-47D only), or
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity) (CH-53E only).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt or suitable substitute.

PERSONNEL

Two persons can prepare and rig this load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Elevate the bucket halfway and tilt toward the rear. Ensure that the front end loader assembly travel locks located at the end of both front end loader boom cylinders are properly pinned in place.
- Secure steering wheel, doors, and all loose equipment with nylon cord or tape as necessary.
- Tape all lights and glass fixtures. Tape over the exhaust opening. (USMC)
- Fold side mirrors inboard and tie or tape as required. Tape windshield wipers to windshield and tie or tape engine compartment hood securely to prevent damage during flight. (USA)
- Engage hand brake. Place transmission in neutral.

- Tie or tape hydraulic lines and hoses in close proximity to the forward lift provisions to prevent possible entanglement during hookup.

Step 2. Rigging

NOTE: Chain link number inside parentheses is used for the 40,000-pound capacity sling set.

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1.
 - Position the apex fitting on top of the forward part of the falling objects protection structure (FOPS). Loop the chain end of the left and right sling legs through their respective lift provisions located on the front bumper inboard of the front end loader support arms. Insert link 3 (3) in the grabhook/grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting on top of the aft part of the FOPS. Loop the chain end of the left sling leg through the left lift provision (closest to the backhoe operator's seat) located at the top left between the left rear wheel and frame. Insert link 5 (9) in the grabhook/grab link.
 - Loop the chain end of the right sling leg through the right lift provision (closest to the backhoe bucket) located at the top right between the right rear wheel and frame. Insert link 10 (11) in the grabhook/grab link.
- Secure all excess chain with tape or nylon cord. Form the felt padding into a tube around the chain end of each sling leg and secure with tape or nylon cord to protect chains and the hydraulic levers.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the FOPS to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: This load is rigged to fly front end loader aft.

One hookup team (apex fitting 2) stands on top of the FOPS. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 2 onto the forward cargo hook. The other hookup team (apex fitting 1) stands on top of the FOPS. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 1 onto the aft cargo hook. The hookup teams then carefully dismount the excavator and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

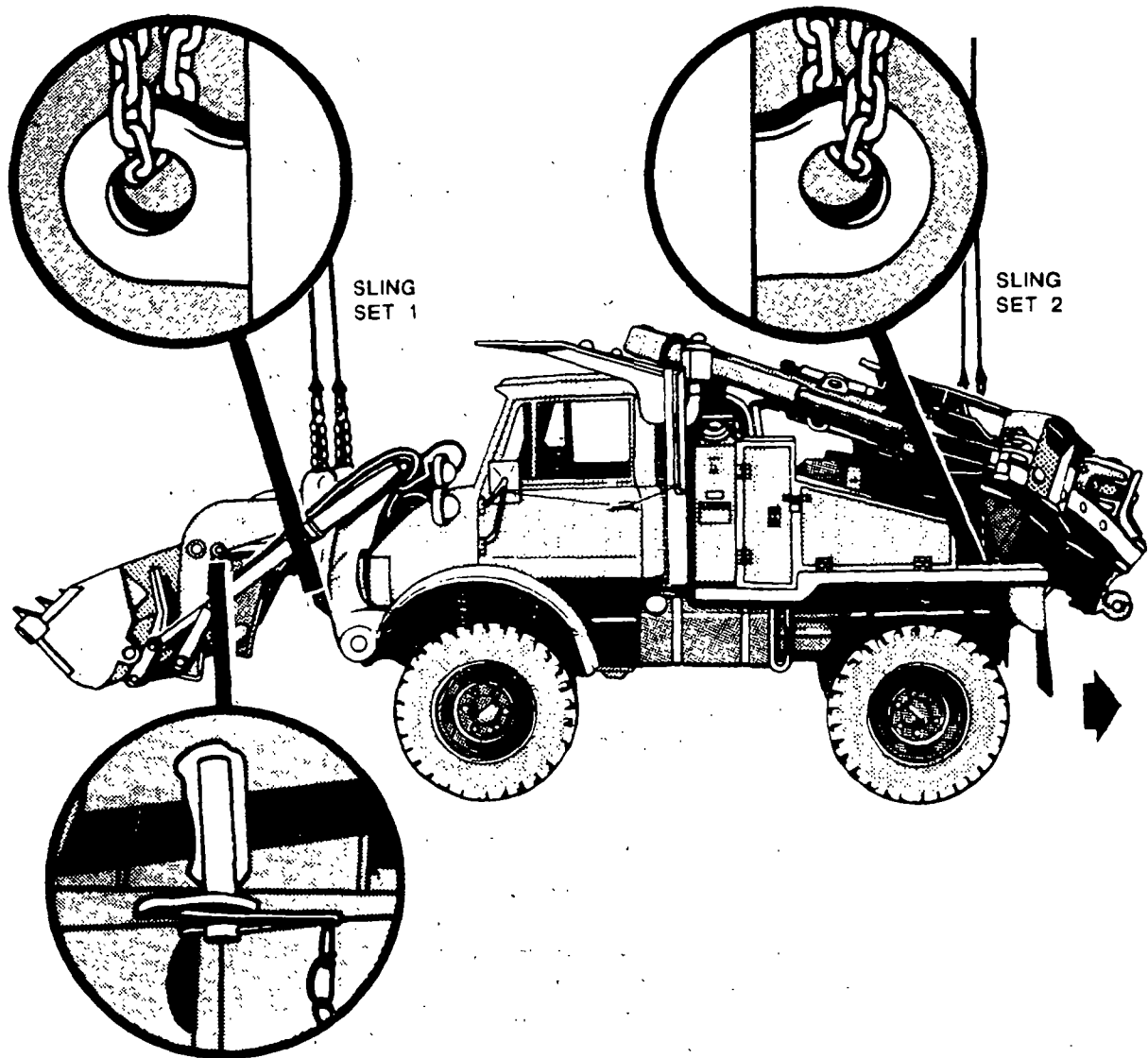


Figure 2-39. High Mobility Materiel Handler (HMMH)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 110 knots.

LOAD DESCRIPTION

- High mobility materiel handler (HMMH), NSN 2420-01-205-8636.
- Weight: 15,650 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt or suitable substitute.

PERSONNEL

Two persons can prepare and rig this load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Ensure that all travel locks are properly pinned in place.
- Engage parking brake.
- Secure steering wheel, doors, and all loose equipment with nylon cord or tape as necessary.
- Fold side mirrors inboard and tie or tape as required.
- Tape windshield wipers to windshield to prevent damage.
- Tie and tape engine compartment hood securely.
- Tie or tape the hydraulic lines and hoses in close proximity to the forward lift provisions to prevent possible entanglement during hookup.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the falling object protection system (FOPS).

- Loop the chain end of the left and right sling legs through their respective lift provisions located near the front bumper outboard of the forklift frame and insert link 3 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on the FOPS.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the frame inboard of the rear wheels and insert link 56 in the grabhook. Secure excess chain with tape or nylon cord.
- Wrap felt padding into a tube around the chain ends on all four sling legs and secure with tape or nylon cord. Position the two aft sling legs at their contact point with the crane boom and tape or tie (breakaway technique).
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The hookup team stands on the FOPS. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the HMMH and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

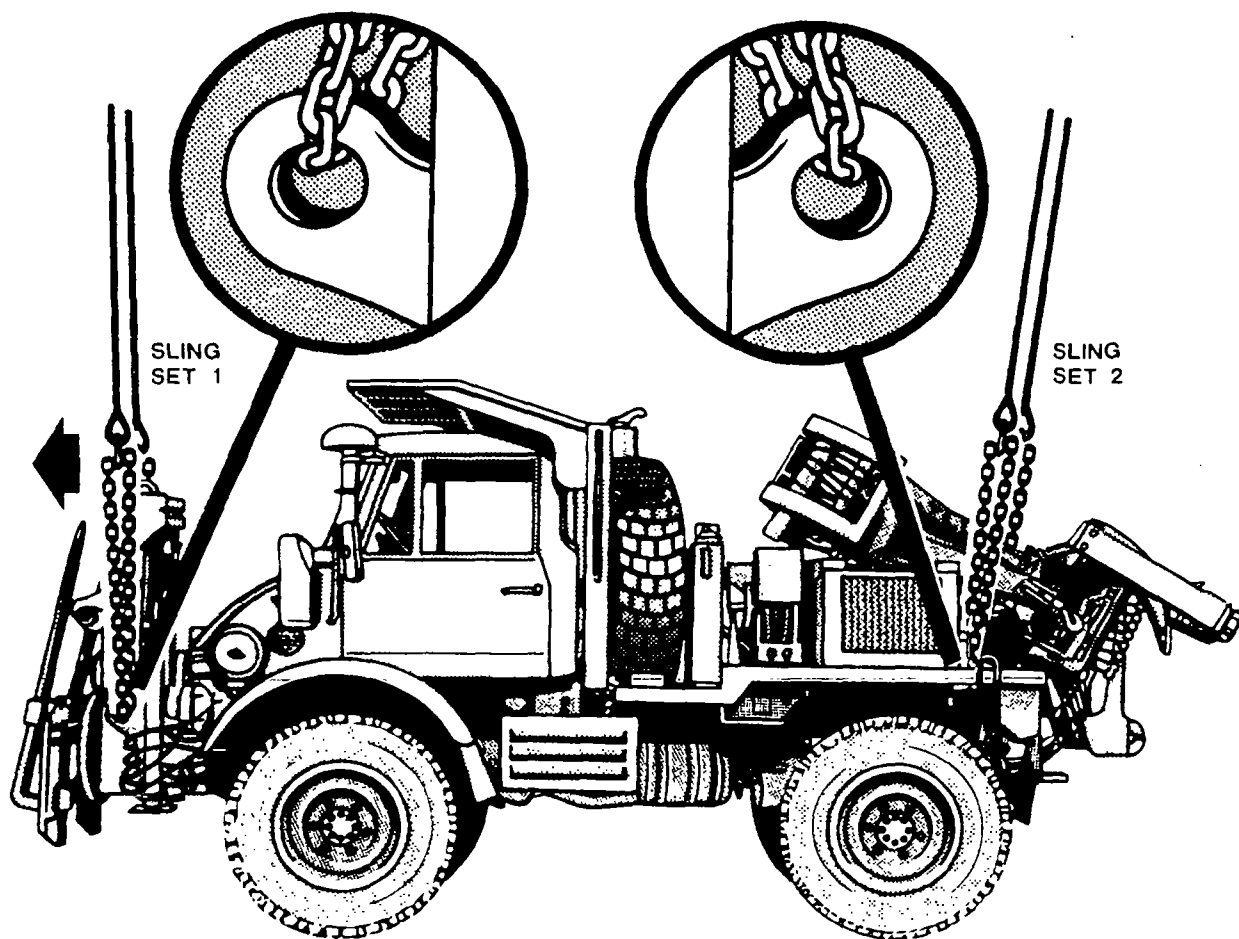


Figure 2-40. 950BS Scoop Loader, Sectionalized

APPLICABILITY

This load, when sectionalized, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Loader, scoop, sectionalized; Type II, model 950BS, LIN L76693.
- Rigged weights:
 - Work section, 15,830 pounds.
 - Power section, 16,110 pounds (with 3/4 fuel).

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down assembly, 15-foot dacron (NSN 1670-00-937-0271) (2 each).
- Tie-down assembly, chain, MB-1 (10,000-pound capacity) (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Chain, 3/8-inch, 8 feet long, (part no. 38850-00053-102) (2 each, power section only).
- Link, coupling (part no. 664-241) (2 each, power section only).

PERSONNEL

- Four persons can sectionalize the scoop loader in 2.5 hours.
- Two persons can prepare and rig each section in 20 minutes.

PROCEDURES

Step 1. Preparation

- Sectionalize the scoop loader according to instructions in operator's manual.
- Work section:
 - Secure the bucket lift arm assembly to the work section housing with two MB-1 chain tie-down assemblies. Pass a chain around the left side of the bucket control group arm cross tube, through the lift point on the housing, and secure the running

ends with an MB-1 tensioning device. Repeat this procedure on the right side of the cross tube.

CAUTION: Chains must be tight to prevent sagging of the hydraulic system during flight.

- Cover all hitch pins and pivot holes with plastic and tape to prevent contamination by dust and dirt.
- Tape all lights.
- Secure tool basket lid, located in the bucket, with nylon cord.

● Power section:

- Cover all hitch pins and pivot holes with plastic and tape to prevent contamination by dust and dirt.
- Secure all hoses and cables located on the front of the section with nylon cord to prevent damage.
- Secure the floating axle in level position with two 15-foot tie-down assemblies. On the left side, pass the running end of a 15-foot tie-down strap down through the tie-down provision aft of the axle, under the axle, and up through the tie-down provision forward of the axle. Secure the running ends of the strap using a D-ring and load binder on top of the axle. Repeat this procedure on the right side. Fold and secure excess webbing and load binder with cotton webbing or tape.
- Install the low velocity airdrop suspension provisions on the left and right sides of the operator's platform (These provisions are used as forward lift points for EAT.) Torque mounting bolts to 640 + 80 foot-pounds.
- Remove exhaust stack and stow on the component tray mounted in the work section bucket. Cover opening of exhaust stack with tape.
- Remove the pre-air cleaner and pad with cellulose padding and stow in the stowage compartment located behind the operator's seat. Cover opening of pre-air cleaner with tape.
- Fold the back of the operator seat down and secure in place with nylon cord. Secure the seat belt over the seat back.
- Tape all lights and instruments.
- Secure all doors and covers with tape or nylon cord.
- Place controls in neutral and release brakes.

Step 2. Rigging

● Work section:

- Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the aft end of the work section (opposite the bucket end).

- Loop the chain end of the left and right sling legs through their respective lift provisions on top of the bucket lift arms and insert link 55 in the grabhook. Secure excess chain with tape or nylon cord.
 - Connect the other two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the bucket.
 - Loop the chain end of the left and right sling legs through their respective lift provisions on the rear of the bucket and insert link 3 in the grabhook.
 - Cluster and tie or tape (breakaway technique) the sling legs in each sling set together to prevent entanglement during hookup and lift-off.
- Power section:
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the power section immediately behind the operator's seat.
 - Loop the chain end of the left and right sling legs through their respective lift provisions on the operator's platform and insert link 10 in the grabhook.
 - Connect the two sling legs to the additional apex fitting (number 2). Using the coupling links, add the 8-foot chain extensions to the two sling legs. Position the apex fitting on the engine deck.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the forward end of the battery box and insert link 20 in the grabhook.
 - Secure excess chain with tape or nylon cord.
 - Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the power section to prevent entanglement during hookup and lift-off.

Step 3. Hookup

- Work section:

NOTE: Connect apex fittings so the work section is carried bucket aft.

- The hookup team stands on the left and right fender. The static wand person discharges the static electricity with the static wand. The helicopter must move forward after sling set 1 is hooked up in order to hook up sling set 2 because of the load configuration. One hookup person places apex fitting 1 onto the forward cargo hook. The other hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook.

- Power section:

NOTE: Connect apex fittings so the power section is carried bumper aft.

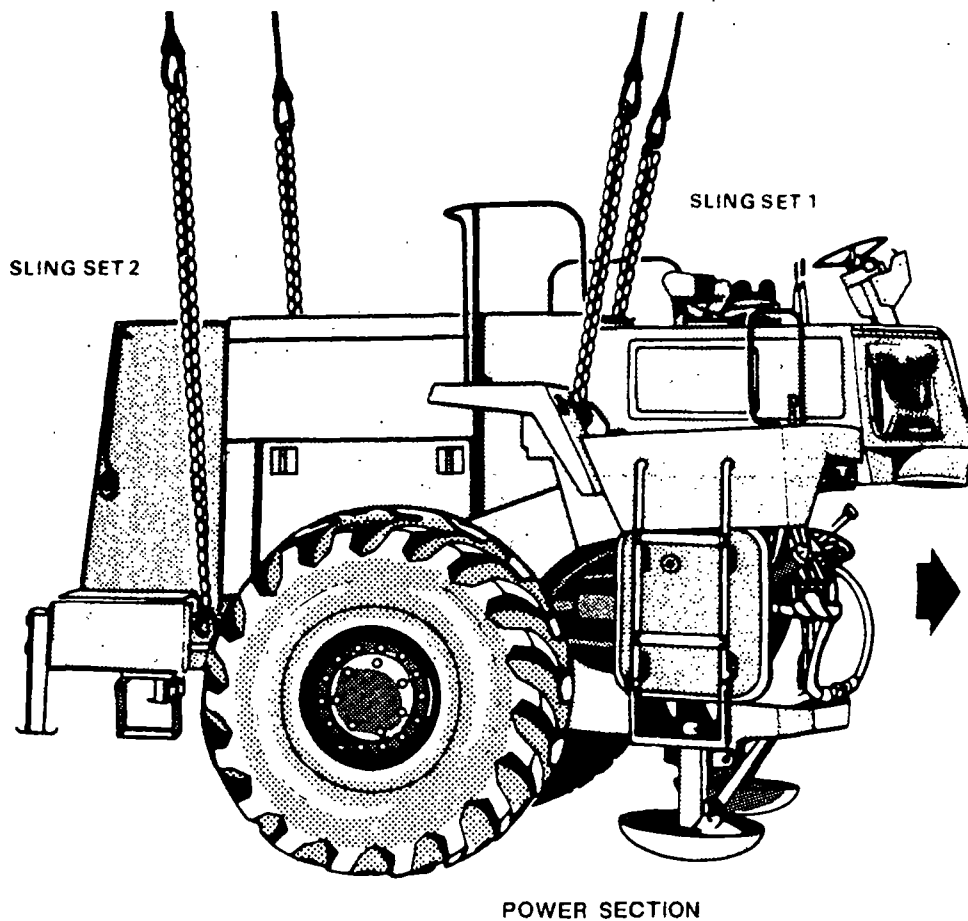
- The hookup team stands on the operator's platform and engine hood. The static wand person discharges the static electricity with the static wand. One hookup person

places apex fitting 1 onto the forward cargo hook. The other hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook.

- After hookup, the teams then carefully dismount from the section and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



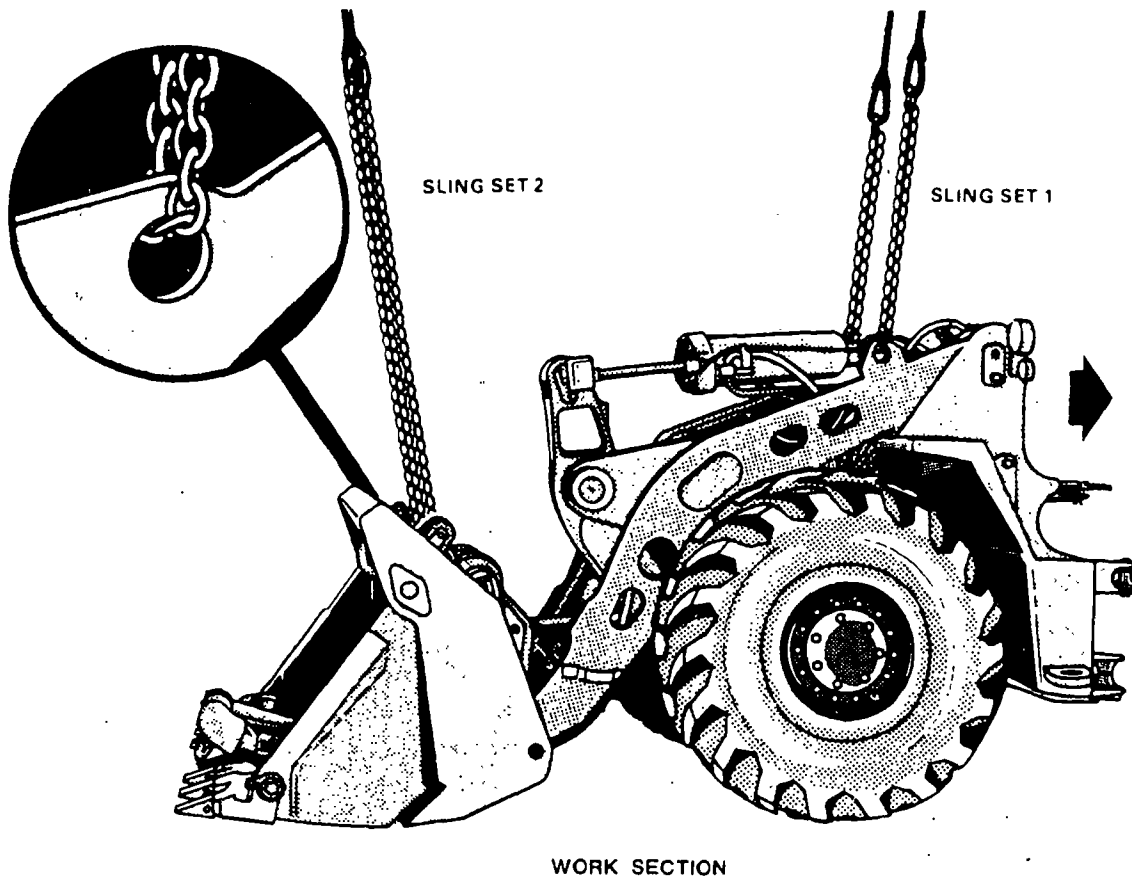


Figure 2-41. 130GS Grader, Sectionalized

APPLICABILITY

This load, when sectionalized, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 100 knots.

LOAD DESCRIPTION

- Grader, sectionalized, model 130GS, LIN J74886, with front-mounted scarifier.
- Weight:
 - Front section (roll-over protective system (ROPS) and low-velocity airdrop (LVAD) suspension provisions removed), 16,120 pounds rigged weight.
 - Rear section, 14,270 pounds rigged weight.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity) (1 set per section).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, material (cellulose).
- Cargo tie assembly (lashing, D-ring, load binder) or tie-down strap, cargo, CGU-1/B, as required.
- Plastic bags.

PERSONNEL

Two persons can prepare and rig each load in 20 minutes after removing the ROPS and LVAD suspension provision and sectionalizing the grader.

PROCEDURES

Step 1. Preparation

- Remove ROPS and LVAD suspension provisions mounted on the front bolster.
- Ensure fuel tank is less than 3/4 full.
- Sectionalize the 130GS grader according to the operator's manual.

- Front section:

- Use cargo tie assembly or tie-down straps to secure each side of the front axle to front tie-down points.
- Loosen front headlight bar, rotate 180 degrees, and retighten. Pad headlights with padding and tape.
- Tape work light on forward edge of operator's manual.
- Secure steering wheel to horizontal control bar on both sides with nylon cord.
- Secure seat with nylon cord.
- Cover all pivot points in articulated hitch group with plastic bags and tape.

- Rear section:

- Cover all pivot points in articulated hitch group with plastic bags or suitable substitute and tape.
- Remove throttle handle and secure in toolbox.
- Pad instrument panel with padding and tape.
- Remove exhaust stack and air cleaner. Secure to top rails with nylon cord.
- Pad and tape rear working light and taillights.
- Secure doors closed with one horizontal loop of nylon cord around body of section.

Step 2. Rigging

- Front section:

- Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the front wheels.
- Loop the chain end of the left and right sling legs through their respective lift provisions and insert link 3 in the grabhook.
- Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the front section above the blade.
- Loop the chain end of the left and right sling legs through their respective lift provisions and insert link 77 in the grabhook.

- Rear section:

- Connect two sling legs to apex fitting number 1. Position the apex fitting in front of the forward set of wheels.
- Loop the chain end of the left and right sling legs through their respective lift provisions inboard of the forward wheels and insert link 36 in the grabhook.
- Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting behind the rear set of wheels.

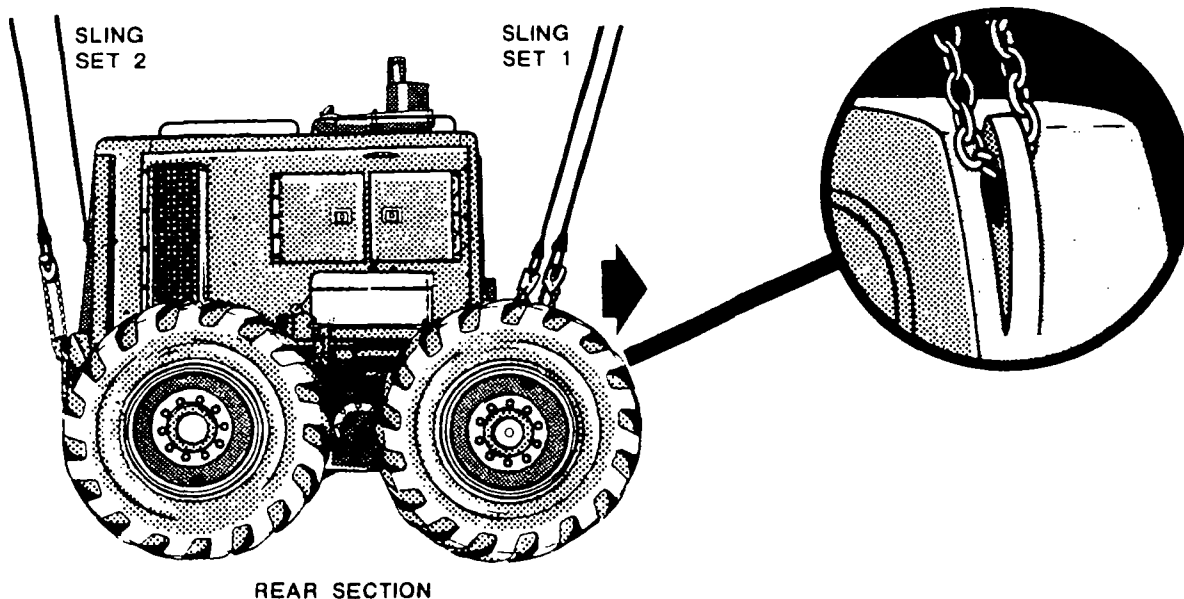
- Loop the chain end of the left and right sling legs through their respective lift provisions and insert link 56 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together on top of each section to prevent entanglement during hookup and lift-off.

Step 3. Hookup

- Front section:
 - The hookup team stands on top of the front section. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook.
- Rear section:
 - The hookup team stands on top of the engine compartment. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook.
- Hookup teams then carefully dismount each section and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



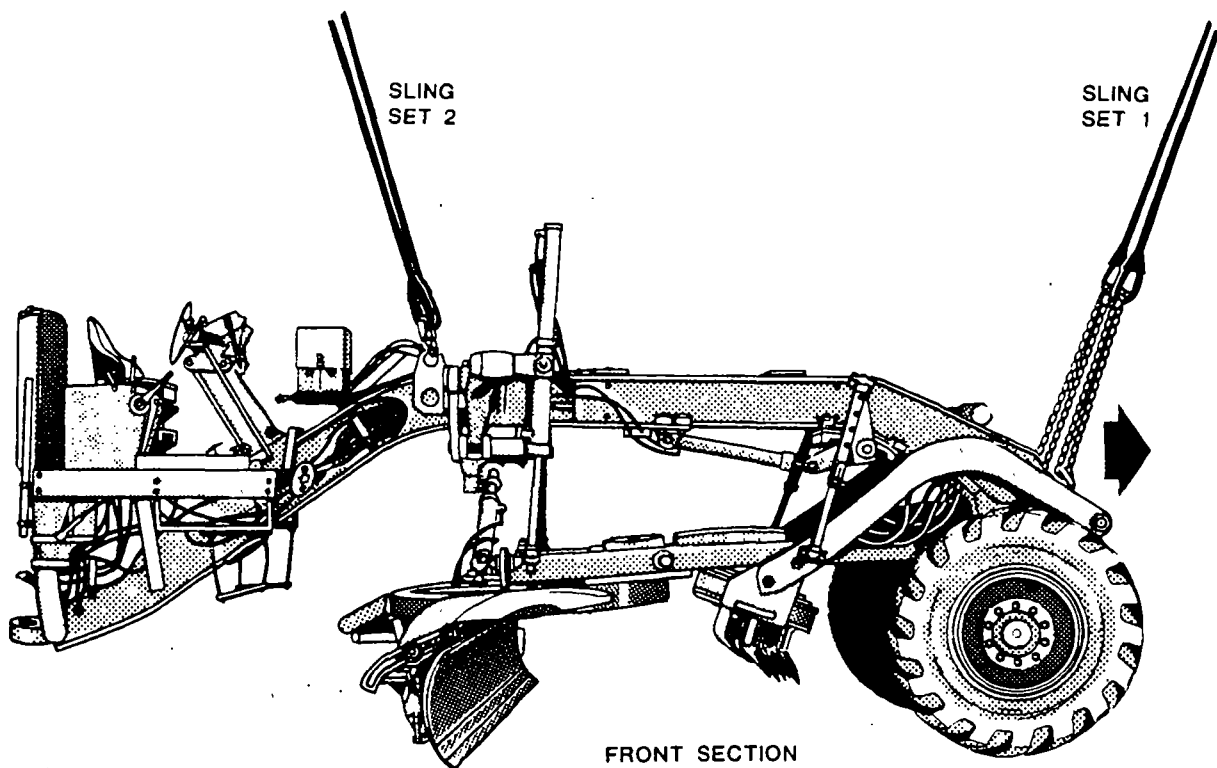


Figure 2-42. 613BS Scraper, Elevating, Sectionalized

APPLICABILITY

The scraper work section is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots. The scraper power section is not suitable as a dual-point load because of suspension point configuration.

LOAD DESCRIPTION

- Scraper, elevating, model 613BS (Type II, sectionalized), LIN S30039.
- Weight: Work section, rigged, 16,330 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Plastic bags (4 each).

PERSONNEL

- Four persons can sectionalize the scraper in 1 hour.
- Two persons can prepare and rig the work section in 20 minutes.

PROCEDURES

Step 1. Preparation

- Sectionalize the scraper according to instructions in operator's manual.
- Work section:
 - Stow elevator motor hoses and hangar arms in elevator flight and in the bowl; secure with nylon cord.
 - Secure hydraulic cylinders up in the stowed position with doubled nylon cord.
 - Fold and secure the step located on outside of bowl.
 - Fold and secure hoses and wires with nylon cord.
 - Tape all lights.
 - Cover all hitch pins and pin holes with plastic and tape to prevent contamination by dirt and dust.

- Secure toolbox lid closed with nylon cord.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the aft end of the rock guard (near the wheels).
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the aft deck near the wheels and insert link 40 in the grabhook.
 - Pull and tie or tape (breakaway technique) the two sling legs to the rock guard.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the rock guard.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the front end of the bowl and insert link 15 in the grabhook.
 - Pull and tie or tape (breakaway technique) the two sling legs to the rock guard.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect apex fittings so the work section is carried rear end (bumper) forward.

The hookup team stands on the load forward of the rock guard. The static wand person discharges the static electricity with the static wand. One hookup person places apex fitting 1 (bumper end) onto the forward cargo hook. The other hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the top of the work section and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

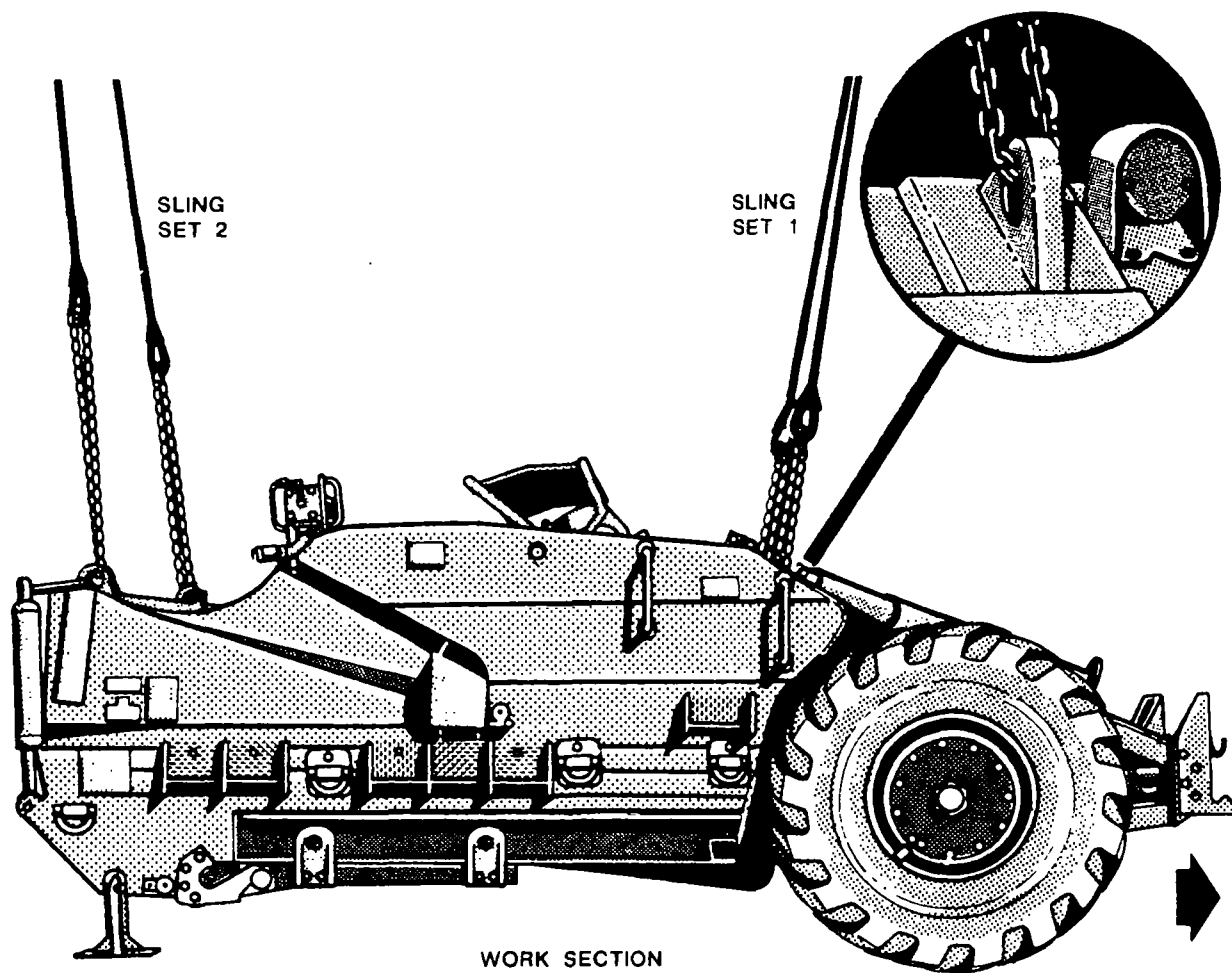


Figure 2-43. 613WDS Water Distributor, Sectionalized

APPLICABILITY

The distributor work section is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up and including 120 knots. The distributor power section is not suitable for EAT as a dual-point load because of the suspension point configuration.

LOAD DESCRIPTION

- Distributor, water, model 613WDS (Type II, sectionalized) LIN D28804.
- Weight: Work section, rigged, 15,400 pounds.

MATERIALS

- Sling set (25,000 pound capacity), with one additional apex fitting (25,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Plastic bags (4 each).

PERSONNEL

- Four persons can sectionalize the distributor in 1 hour.
- Two persons can prepare and rig the work section in 20 minutes.

PROCEDURES

Step 1. Preparation

- Sectionalize the distributor according to instructions in the operator's manual.
- Work section:
 - Secure the distribution control panel and cable in place on top of the tank with nylon cord.
 - Ensure that the tank manhole cover is closed and secured.
 - Close and secure the toolbox and hose stowage compartment covers with nylon cord.
 - Secure the hose nozzle and reel with nylon cord.
 - Cover hitch pins and pin holes with plastic and tape to prevent contamination by dust and dirt.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting above the aft (wheel) end of the water tank.
 - Loop the chain end of the left and right sling leg through their respective lift provisions on the corners of the water tank and insert link 30 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the forward end of the tank.
 - Loop the chain end of the left and right sling leg through their respective lift provisions located on the corners of the forward edge of the tank and insert link 45 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs together on top of the tank to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The hookup team stands on top of the work section. The static wand person discharges the static electricity with the static wand. One hookup person places apex fitting 1 onto the forward cargo hook. The other hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts over the wheel end of the work section and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

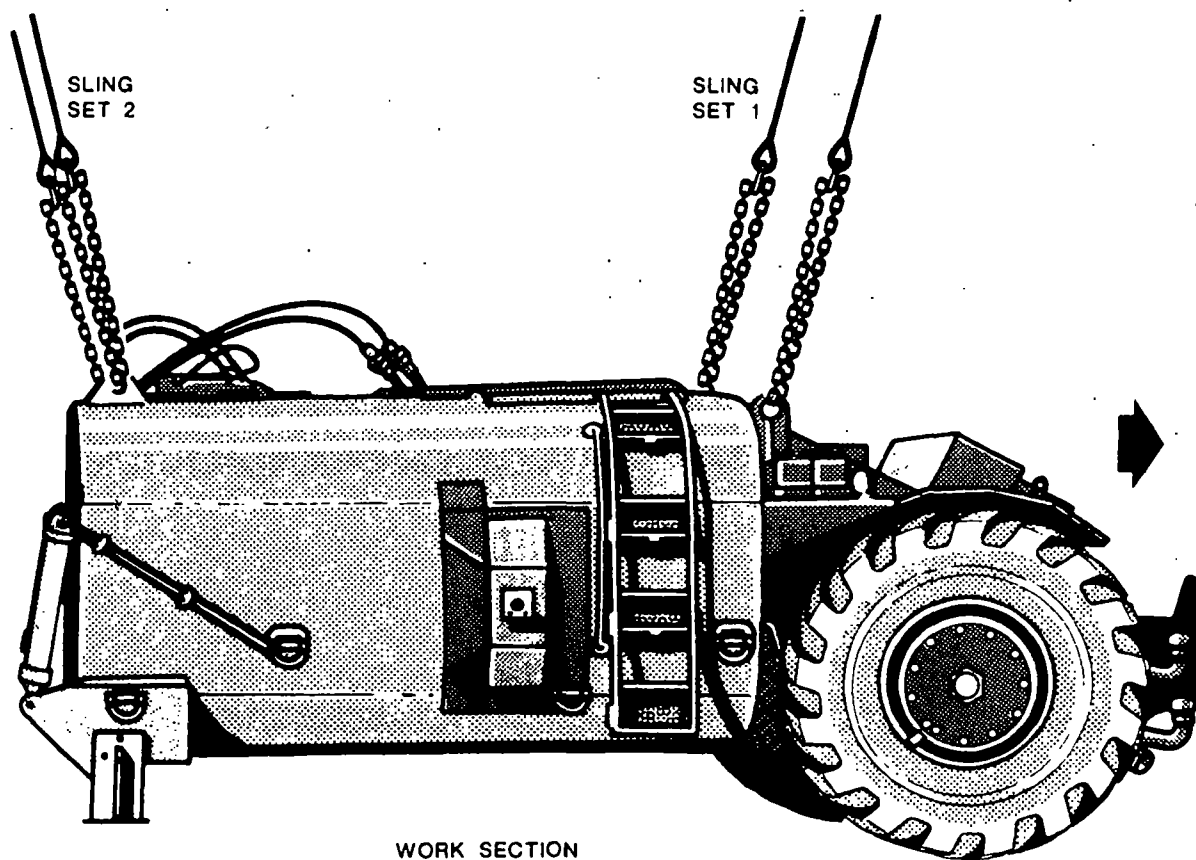


Figure 2-44. Roller, Towed, Vibrating

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Roller, towed, vibrating, smooth drum, airmobile, LIN S10682, NSN 3895-01-193-4078.
- Weight: 4,830 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Lift tongue and position support leg in its stowed or travel position. Secure with nylon cord.
- Check battery box cover, fuel cap, hoses, and any loose items for security. Tie or tape any loose items as required.

Step 2. Rigging

- Sling set 1 (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on the tongue.
 - Loop the chain end of the left and right sling leg through the respective lift provision on the tongue end of the roller and insert link 3 in the grabhook.
- Sling set 2 (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting behind the roller.

- Loop the chain end of the left and right sling leg through the respective lift provision on the rear end of the roller and insert link 3 in the grabhook.
- Cluster and tape or tie (breakaway technique) the sling legs in each sling set together on top of the roller to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings so the roller is carried tongue aft.

The hookup team stands alongside the load. The static wand person discharges the static electricity with the static wand. One hookup person places apex fitting 1 onto the aft cargo hook. The other hookup person places apex fitting 2 onto the forward cargo hook. Do not use the center cargo hook. The hookup team remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

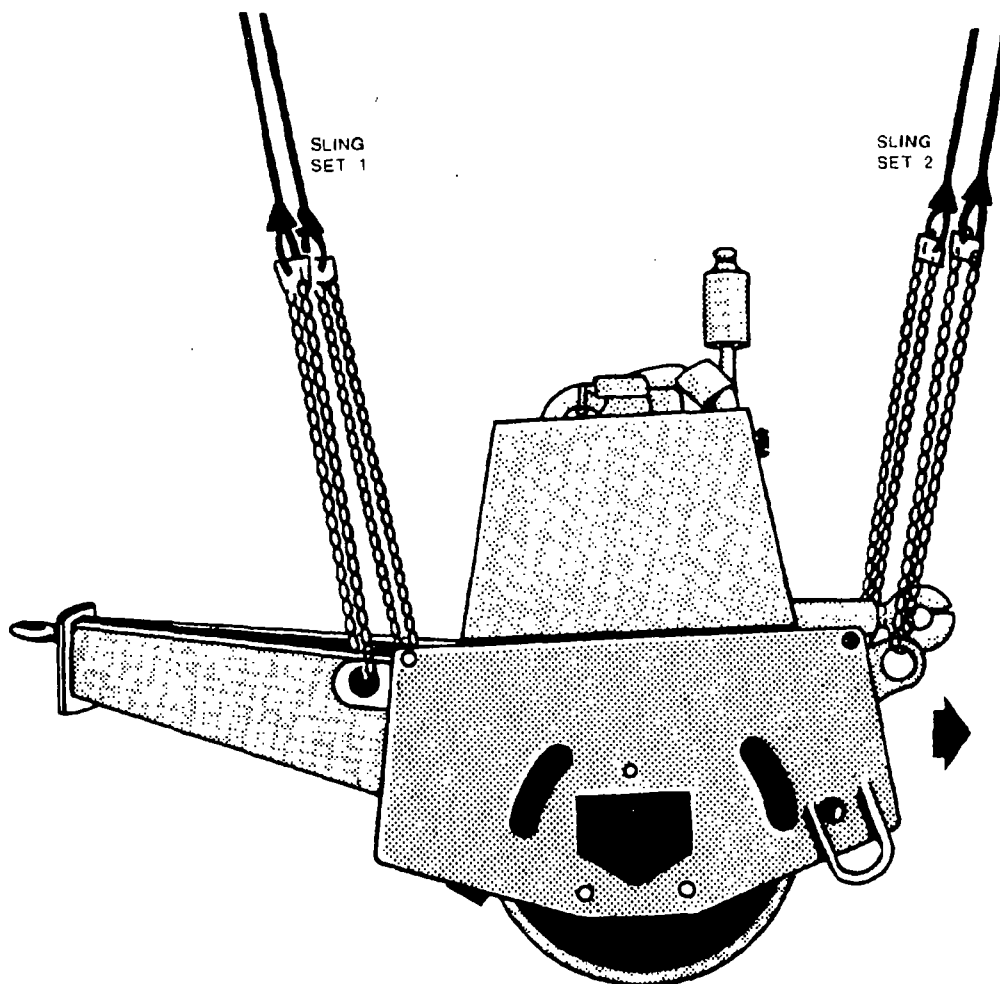


Figure 2-45. Roller, Compactor, Vibrator

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 80 knots.

LOAD DESCRIPTION

- Roller, compactor, vibrator, TAMCN B1785, NSN 3895-01-135-3703.
- Weight: 24,340 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Chain, 8-foot, part no. JETS-WMC-5000 (10,000-pound capacity) from a 40,000-pound capacity sling set (2 each).
- Coupling link, part no. 577-0815 (2 each).
- Tie-down strap, cargo, CGU-1/B, as required.
- Padding, felt or cellulose.

PERSONNEL

Two persons can prepare and rig this load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Make sure the roller is secured in the down position according to instructions in operator's manual. Secure all hatches and door panels with tie-down straps.
- Tape over air filter intake and exhaust pipe openings. Tape over windows, lights, and reflectors.
- Engage hand brakes. Place transmission in neutral.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Using the coupling link, attach one 8-foot chain extension to each of the two sling leg assemblies.
 - Position the apex fitting on top of the front of the compactor. Loop the chain end of the left and right sling legs through their respective lift provision openings located at the bottom of the roller supporting arm and insert link 41 in the grab link. Secure excess chain with tape or nylon cord.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting on top of the rear of the compactor. Loop the chain end of the left and right sling legs through their respective lift provision openings located between the engine and the rear tire and insert link 3 in the grab link.
 - Pad the sling legs in the area where the slings rub against the engine housing. Secure padding with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the compactor to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the forward end of the compactor. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the rear end of the compactor. The static wand person discharges the static electricity with the static discharge wand. The forward hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the compactor and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

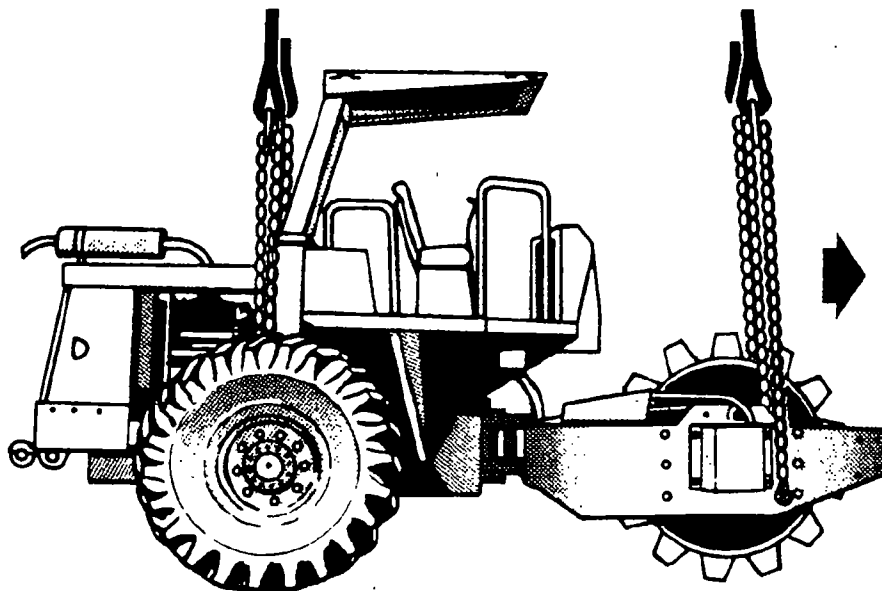


Figure 2-46. Mine Clearing Line Charge Mounted on M353 Trailer

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 140 knots.

LOAD DESCRIPTION

- Mine clearing line charge (MICLIC), complete, LIN L67342:
 - Trailer chassis, M353, general purpose (GP), 2,780 or 2,840 pounds depending on trailer modifications.
 - Launcher, MK155, mine clearing, 860 pounds.
 - Charge, demolition, M68A2, 2,486 pounds.
 - Rocket motor, MK22, 186 pounds.
- Total weight: 6,312 or 6,372 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.
- Tie-down straps, cargo (CGU-1/B or equivalent, used to secure the rocket motor box inside the helicopter) (4 each).

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Ensure that all components are securely attached together.
- The rocket motor cannot be safely secured to the load in this configuration; therefore, the rocket motor box must be kept separate and loaded internally into the helicopter.
- Ensure that the storage box lid is closed and secure. Tie off hoses and safety chains and secure any loose items with nylon cord or tape, as required.
- Engage parking brake.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on the trailer tongue.
 - Loop the chain end of the left and right sling legs through their respective lift provisions on the trailer chassis located aft of the trailer leveling wheels. Insert link 3 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the aft end of the launcher.
 - Loop the chain end of the left and right sling legs through their respective lift provisions on the trailer chassis located aft of the trailer wheels by the rear bumper. Insert link 3 in the grabhook.
- Raise both apex fittings above the launcher. Tie or tape (breakaway technique) the aft sling legs to the launch rail to prevent entanglement during hookup and lift-off.
- Cluster and tie (breakaway technique) the sling legs in each sling set above the launch rail with cotton webbing or tape to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings so that the trailer is carried front end (trailer lunette) aft.

- Land helicopter and load rocket motor box internally into helicopter. Secure box with tie-down straps as directed by the aircrew.

The hookup team stands on the trailer chassis. The static wand person discharges the static electricity with the static wand. One hookup person (trailer wheel end) places apex fitting 2 onto the forward cargo hook. The other hookup person places apex fitting 1 onto the aft cargo hook. Do not use the center cargo hook. The hookup team dismounts and remains close to the load as the helicopter removes slack in the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

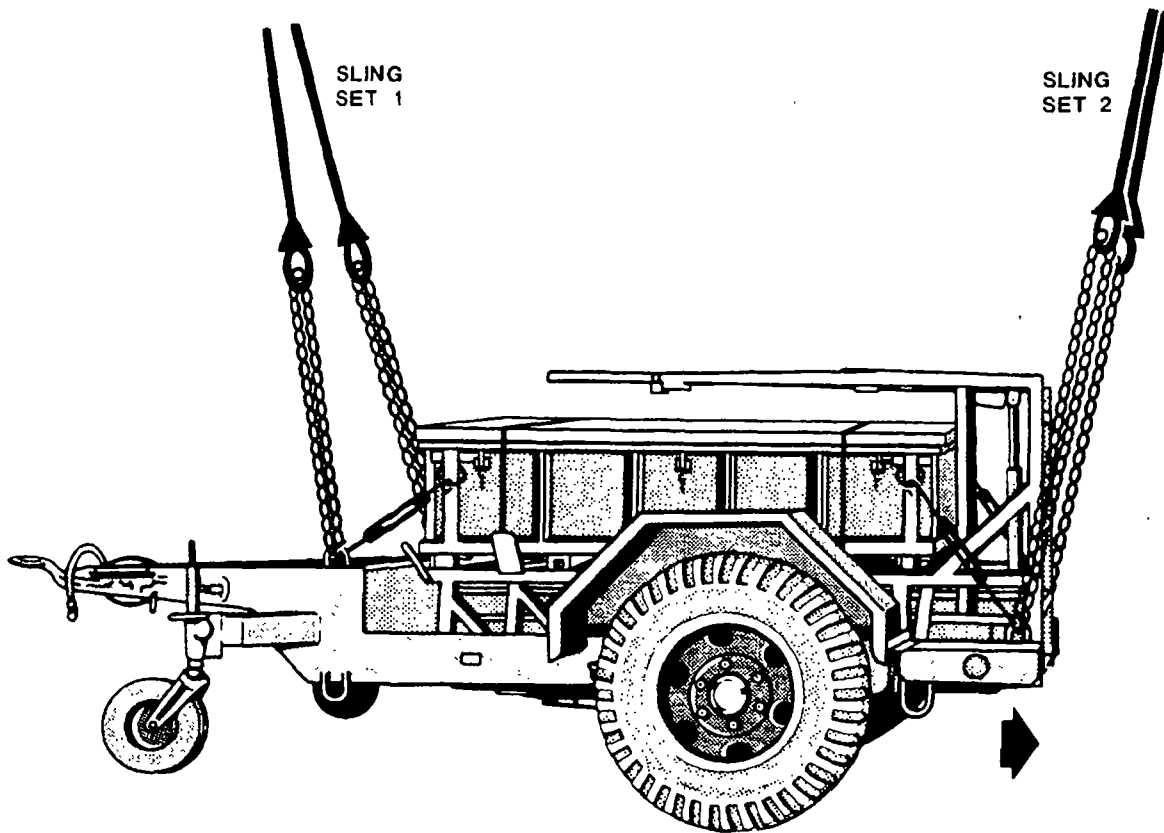


Figure 2-47. Mine Clearing Line Charge Mounted on M200A1 Trailer.

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Mine clearing line charge (MICLIC), complete, mounted on M200A1 trailer chassis:
 - Trailer chassis, M200A1, NSN 2330-00-331-2307, 2,470 pounds.
 - Launcher, Mk155, NSN 1055-01-281-2770, 860 pounds.
 - Charge, demolition, M68A2, NSN 1375-01-125-6521, 2,486 pounds.
 - Rocket motor, Mk22, 186 pounds.
- Weight: 6,002 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B or equivalent (used to secure rocket motor box inside helicopter) (4 each).

PERSONNEL

Two persons can prepare and rig the load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Ensure that all components are securely attached together.
- The rocket motor cannot be safely secured to the load in this configuration; therefore, the rocket motor box must be kept separate and loaded internally into the helicopter.
- Ensure that the launch rail is in the collapsed or storage position and not in its vertical position.
- Ensure that the storage box lid is closed and secured. Secure hoses, chains, and any other loose items with nylon cord or tape, as required.

- Engage parking brake.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of lunette end of the demolition charge container.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the trailer chassis frame aft of the lunette and insert link 10 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the aft end of the launcher.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the trailer chassis below the aft end of the demolition charge container and insert link 3 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together above the launch rail to prevent entanglement during hookup and lift-off.

Step 3. Hookup

- Land helicopter and load rocket motor box internally into the helicopter. Secure the box with tie-down straps as directed by the aircrew.

NOTE: Connect apex fittings to the cargo hooks so the trailer lunette is aft.

The hookup team stands on the demolition charge container. The static wand person discharges the static electricity with the static wand. One hookup person (lunette end) places apex fitting 1 onto the aft cargo hook. The other hookup person places apex fitting 2 onto the forward cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the trailer and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

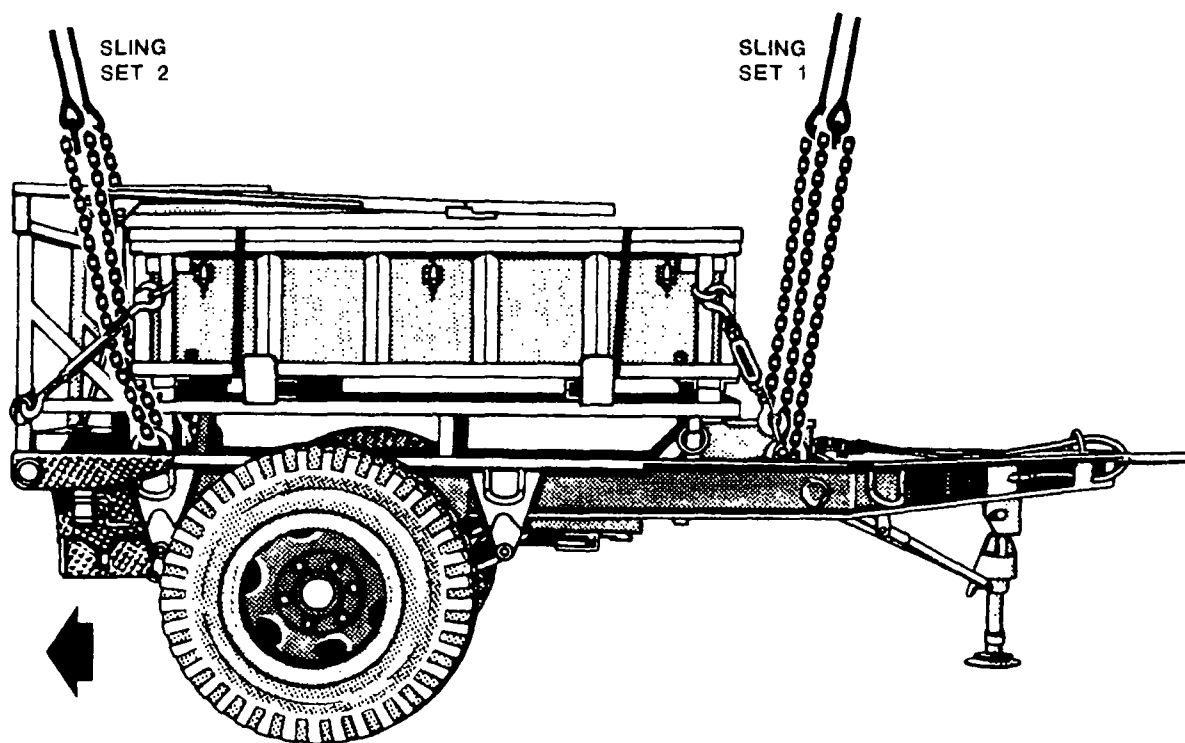


Figure 2-48. LRT-110, 7 1/2-Ton Crane

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- 7 1/2-ton crane, Type II, LRT-110, LIN C36219.
- Weight: 24,230 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cotton, webbing, 1/4-inch, 80-pound breaking strength.
- Nylon, tubular, 1/2-inch, 1,000-pound breaking strength.
- Tie-down, nylon, cargo, CGU-1/B (1 each).
- Padding material, felt or cellulose.

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Fold side mirrors in toward cab and tie or tape, as necessary. Tape or secure windshield wipers to windshield.
- Ensure the front wheels are pointed straight ahead. Secure the steering wheel with nylon cord or tape.
- Secure doors, toolbox covers, and loose equipment with nylon cord or tape.
- Secure hook-block assembly to the end of the boom mast with tie-down strap or equivalent.
- Secure boom light power cable with nylon cord or tape.
- Insert wooden cable wedges at the drum to prevent the cable from unspooling if the cable becomes slack.
- Secure wooden cable wedges (left and right side) with 1/2-inch tubular nylon.

Step 2. Rigging

- Sling set 1 (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the boom directly above the front wheels.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the inboard side of the front outriggers. Insert link 3 in the grabhook.
 - Pad the sling legs where they contact the crane cab.
- Sling set 2 (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the boom directly above the rear wheels.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the inboard side of the rear outriggers. Insert link 3 in the grabhook.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings so that the crane is carried engine forward.

The static discharge person stands at the center of the crane by the boom base and discharges the static electricity with the static wand. One hookup person stands on the engine deck and places apex fitting 2 onto the forward cargo hook. The other hookup person stands on the cab top and places apex fitting 1 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the crane and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

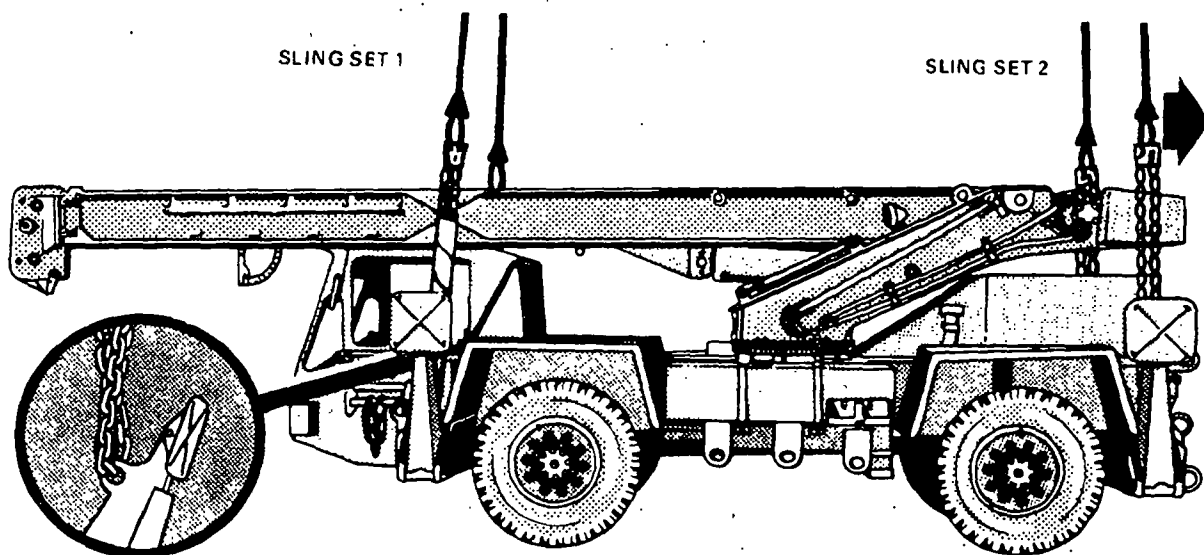


Figure 2-49. LRT-110, 7 1/2-Ton Crane (Boom Section)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47 helicopters at airspeeds up to and including 140 knots.

LOAD DESCRIPTION

- Boom section, LRT-110, Type II, 7 1/2-ton crane.
- Weight: 8,600 pounds.

MATERIALS

- Sling set (10,000-pound capacity), with one additional apex fitting (10,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Nylon, tubular, 1/2-inch, 1,000-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (1 each).

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Sectionalize the crane according to the instructions in the operator's manual.
- Secure hook-block assembly to the end of the boom mast with tie-down strap or equivalent.
- Secure boom light power cable with tape or nylon cord.
- Insert wooden cable wedges at the drum to prevent the cable from unspooling if the cable becomes slack.
- Secure wooden cable wedges (left and right side) with 1/2-inch tubular nylon.
- Secure the boom hydraulic hoses with tape or nylon cord. Make sure the hoses are clear of the boom base.

Step 2. Rigging

- Sling set 1 (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the boom counterweight.

- Loop the chain end of the left and right sling legs through their respective lift provisions on top of the boom left and right support arms. Insert link 3 in the grabhook.
- Sling set 2 (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the middle of the boom by the lift provisions.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the left and right sides of the boom. Insert link 3 in the grabhook.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings so that the boom section is carried counterweight end forward.

The static discharge person stands beside the boom and discharges the static electricity with the static wand. One hookup person stands beside the rear (counterweight) end of the boom and places apex fitting 1 onto the forward cargo hook. The other hookup person stands beside the middle of the boom and places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

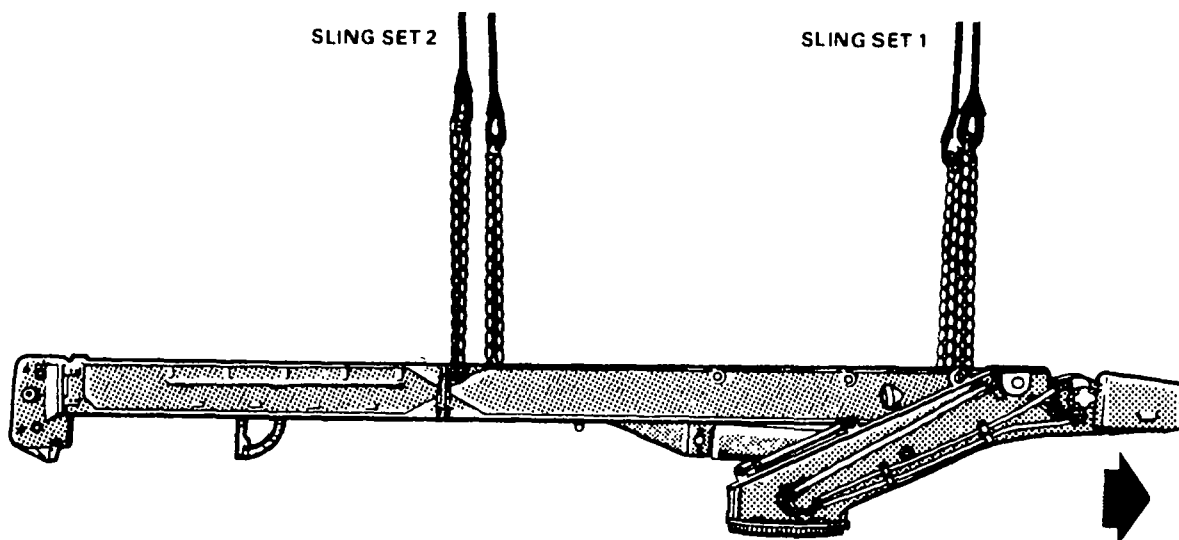


Figure 2-50. LRT-110, 7 1/2-Ton Crane (Power Unit)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 140 knots.

LOAD DESCRIPTION

- Power unit section, LRT-110, Type II, 7 1/2-ton crane, sectionalized.
- Weight: 15,600 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cotton webbing, 1/4-inch, 80-pound breaking strength.
- Nylon, tubular, 1/2-inch, 1,000-pound breaking strength.
- Tie-down strap, nylon, cargo, CGU-1/B (1 each).
- Padding, felt or cellulose.

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Sectionalize the crane according to instructions in the operator's manual.
- Fold side mirrors in toward cab and tie or tape, as necessary. Tape or secure windshield wipers to windshield.
- Ensure the front wheels are pointed straight ahead. Secure the steering wheel with tape or nylon cord.
- Secure doors, toolbox covers, and loose equipment with tape or nylon cord.

Step 2. Rigging

- Sling set 1 (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the boom directly above the front wheels.

- Loop the chain end of the left and right sling legs through their respective lift provisions located on the inboard side of the front outriggers. Insert link 3 in the grabhook.
- Pad the sling legs where they contact the crane cab.
- Sling set 2 (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the boom directly above the rear wheels.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the inboard side of the rear outriggers. Insert link 3 in the grabhook.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings so that the crane is carried engine forward.

The static discharge person stands at the center of the crane by the boom base and discharges the static electricity with the static wand. One hookup person stands on the engine deck and places apex fitting 2 onto the forward cargo hook. The other hookup person stands on the cab top and places apex fitting 1 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the crane and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

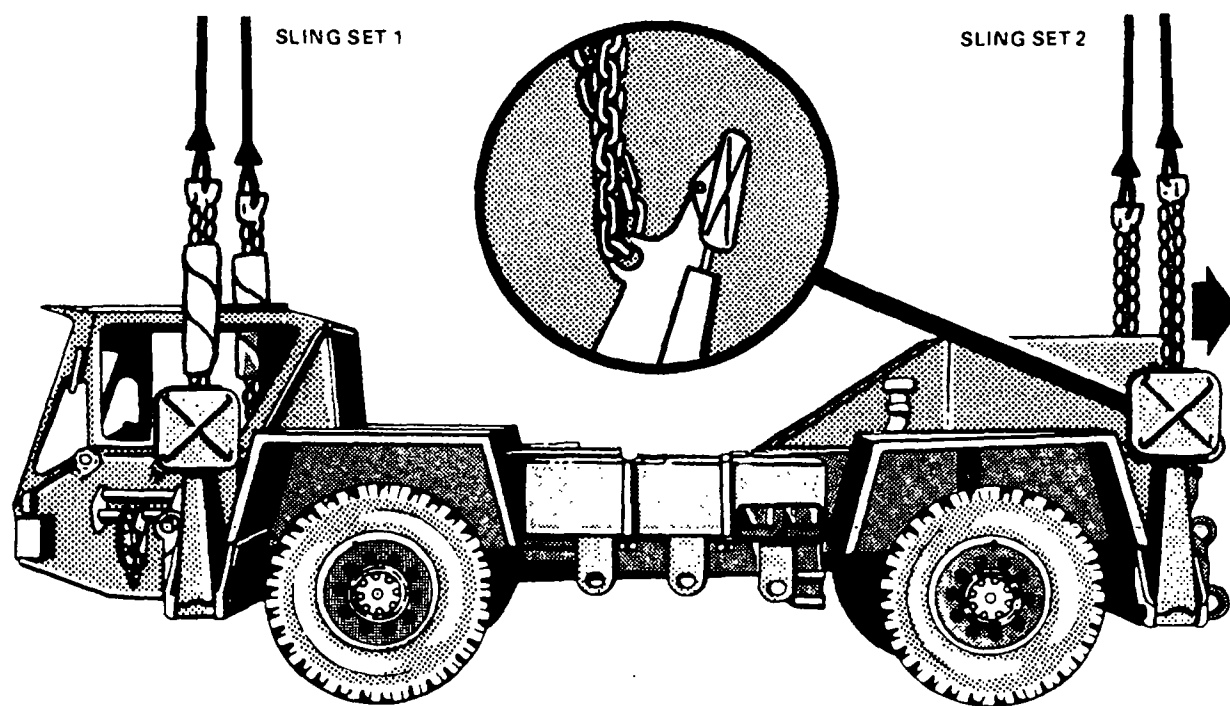


Figure 2-51. SP-7 Wheel-Mounted Crane

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 100 knots.

LOAD DESCRIPTION

- Crane, wheel-mounted, SP-7, 7 1/2-ton (Pettibone), TAMCN B0445, NSN 3810-00-377-1464.
- Weight: 27,640 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive; 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B, (5,000-pound capacity) as required.

PERSONNEL

Two persons can prepare and rig this load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Make sure that the boom is secured in the down position according to operator's manual instructions.
- Secure all hatches and door panels with tie-down straps or nylon cord.
- Tape over windows, lights, and reflectors. Tape over exhaust opening.
- Engage hand brake. Place transmission in neutral.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1.
 - Position the apex fitting on top of the front of the crane. Loop the chain end of the left and right sling legs through their respective lift provisions located below the front corners of the windshield and insert link 3 in the grab link.
- Aft sling set (2 sling legs):

- Connect two sling leg assemblies to the additional apex fitting (number 2).
- Position the apex fitting on top of the aft end of the crane. Loop the chain end of the left and right sling legs through their respective lift provisions located on top of the boom near the crane rear end and insert link 11 in the grab link. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the crane to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the front of the crane. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the rear of the crane. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the crane and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

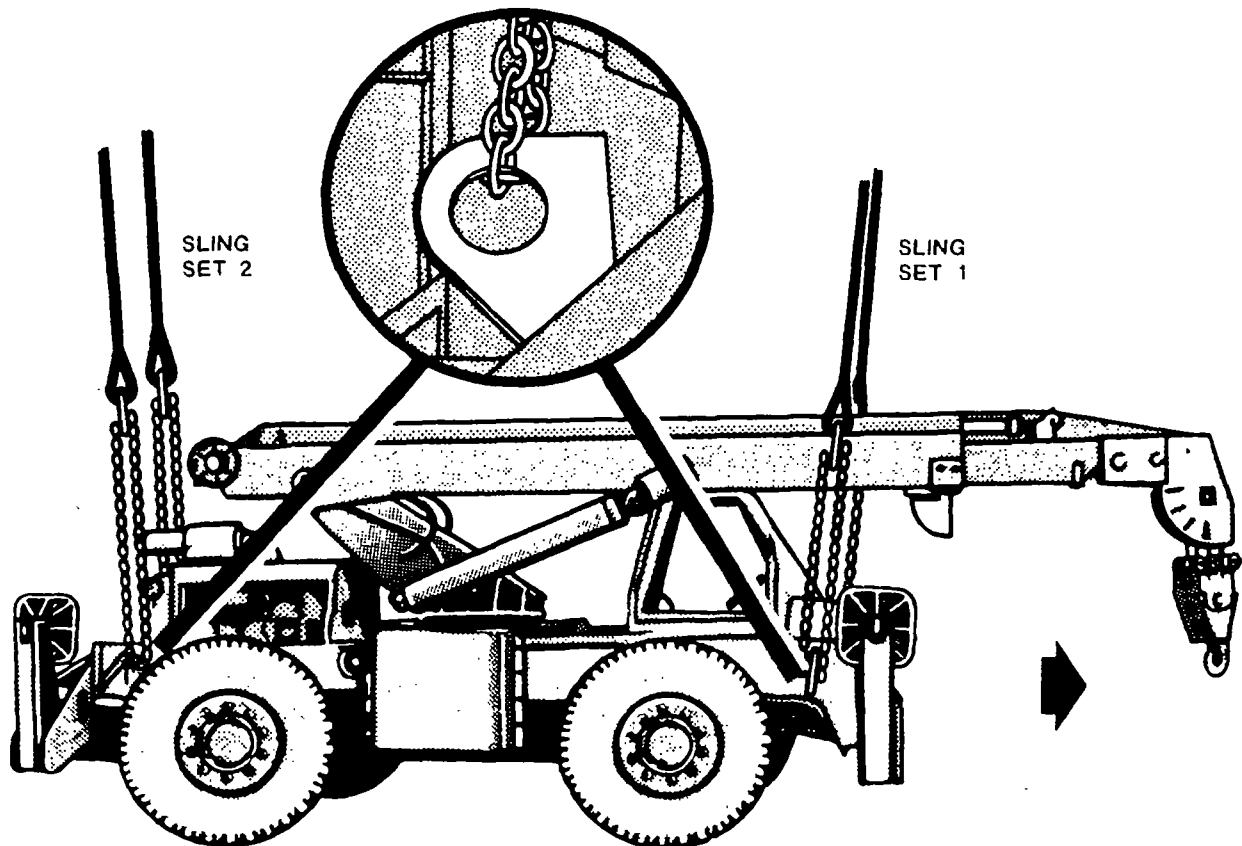


Figure 2-52. Truck, Forklift, MC-4000

APPLICABILITY

The MC-4000 forklift is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Truck, forklift, rough terrain, MC-4000, TAMCN B2565, NSN 3930-00-415-0098.
- Weight: 8,600 pounds.

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each), or
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Engage parking brake. Place transmission in neutral.
- Secure the seat cushions in place with nylon cord.
- Insert the articulating lock pin to keep the forklift front and rear sections from twisting in flight.
- Raise the fork tines approximately 1 foot above the ground. Lift the ends of the fork tines by hand to point upward and secure the fork tines to the lift cylinder frame using the tie-down strap.

Step 2. Rigging

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outerload-carrying sling legs.

NOTE: Chain link number inside parentheses is used for the 40,000-pound capacity sling set.

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1.
 - Position the web ring/apex fitting on top of the ROPS. Loop the chain end of the left and right sling legs through their respective lift provisions located between the front tire and the chassis. Insert link 3 (3) in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the web ring/apex fitting on top of the engine deck. Loop the chain end of the left and right sling legs through their respective lift provisions located at the rear and insert link 25 (35) in the grab link. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the engine deck and ROPS to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) kneels on the ROPS. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the engine deck. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the forklift and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

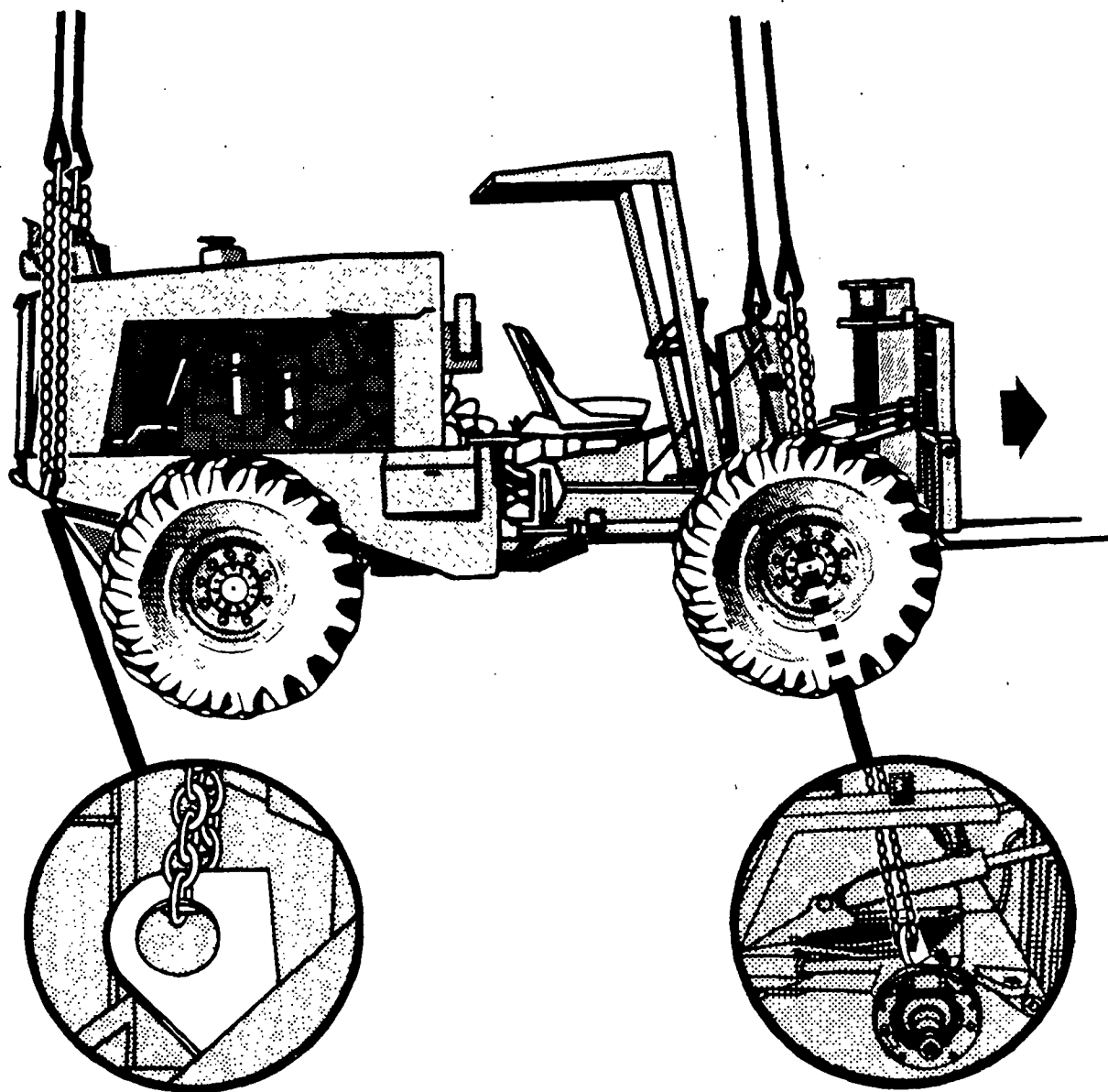


Figure 2-53. Truck, Forklift, MC-6000

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 130 knots.

LOAD DESCRIPTION

- Forklift truck, MC-6000, 6,000-pound capacity, TAMCN B2560.
- Weight: 19,800 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt or suitable substitute.
- Tie-down strap, cargo, CGU-1/B (5,000-pound capacity) (4 each).

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Position the forks so that they are sitting on the travel blocks and tilted all the way aft.
- Using two tie-down straps, make a large single loop and secure both rear access doors longitudinally.
- Using the other two tie-down straps, secure both engine access doors.
- Secure the toolbox lid closed using tape or nylon cord.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1.
 - Position the apex fitting on top of the forward edge of the ROPS. Route the sling legs to the forward part of the forklift in front of the driving lights.

- Loop the chain end of the left and right sling legs through their respective lift provisions mounted on the frame inboard of the top of the front tires and insert link 5 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting on top of the engine deck. Loop the chain end of the left and right sling legs through their respective lift provisions located on the frame aft of the rear tires and insert link 5 in the grab link.
- Lift the sling leg and tie or tape (breakaway technique) the grabhooks to the ROPS. Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the forklift to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the front fenders. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the engine deck. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the forklift and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

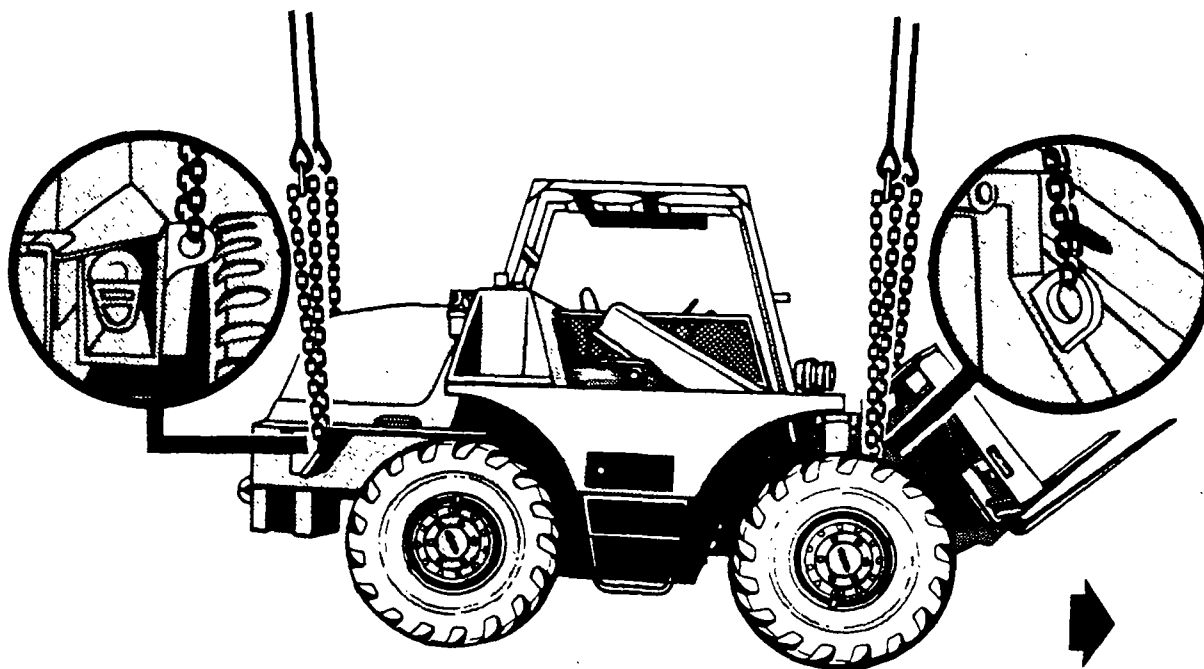


Figure 2-54. Boat, Bridge Erection

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 30 knots.

NOTE: This load became extremely unstable at airspeeds above 30 knots.

LOAD DESCRIPTION

- Boat, bridge erection, 27-foot, TAMCN B0114.
- Weight: 6,000 pounds.

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pound breaking strength.

PERSONNEL

Two persons can prepare and rig the load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Remove canvas covers and stow in the rear (stern) section.
- Remove or secure all loose items of equipment with tape or nylon cord.
- Attach the front section to the rear section of the boat.
- Tape all glass items, such as lights, gauges, and compasses.
- Make sure both cradles are not attached to the boat sections.

Step 2. Rigging

NOTE: When using the 15,000-pound multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

- Forward sling set (number 1):

- Position the web ring on top of the forward (bow) section of the boat.
- Loop the chain end of the left and right sling legs through their respective lifting U-bolts located on the left and right side of the forward end of the stern section. Insert link 4 in the grab link.
- Aft sling set (number 2):
 - Position the web ring on top of the aft (stern) section of the boat. Route the sling leg chains to the aft (stern) side of the horizontal arms of the towing bitt.
 - Wrap the chain end of the left sling leg two times around the vertical post of the towing bitt and insert link 8 in the grab link. Wrap the chain end of the right sling leg in the opposite direction two times around the vertical post of the towing bitt and insert link 8 in the grab link. Make sure that the chain is wrapped around the vertical post below the horizontal arms.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together on top of the boat to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings to the cargo hooks so the aft (stern) end is forward.

One hookup team (sling set 2) stands on top of the stern section. The static wand person discharges the static electricity with the static wand. The hookup person places web ring 2 onto the forward cargo hook. The other team (sling set 1) stands on top of the bow section. The static wand person discharges the static electricity with the static wand. The hookup person places web ring 1 onto the aft cargo hook. The hookup teams then carefully dismount the boat and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

NOTE: Brief the helicopter crew to relax sling leg tension and hover to the side of the load before releasing the web rings. The boat may be damaged if this precaution is not observed.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

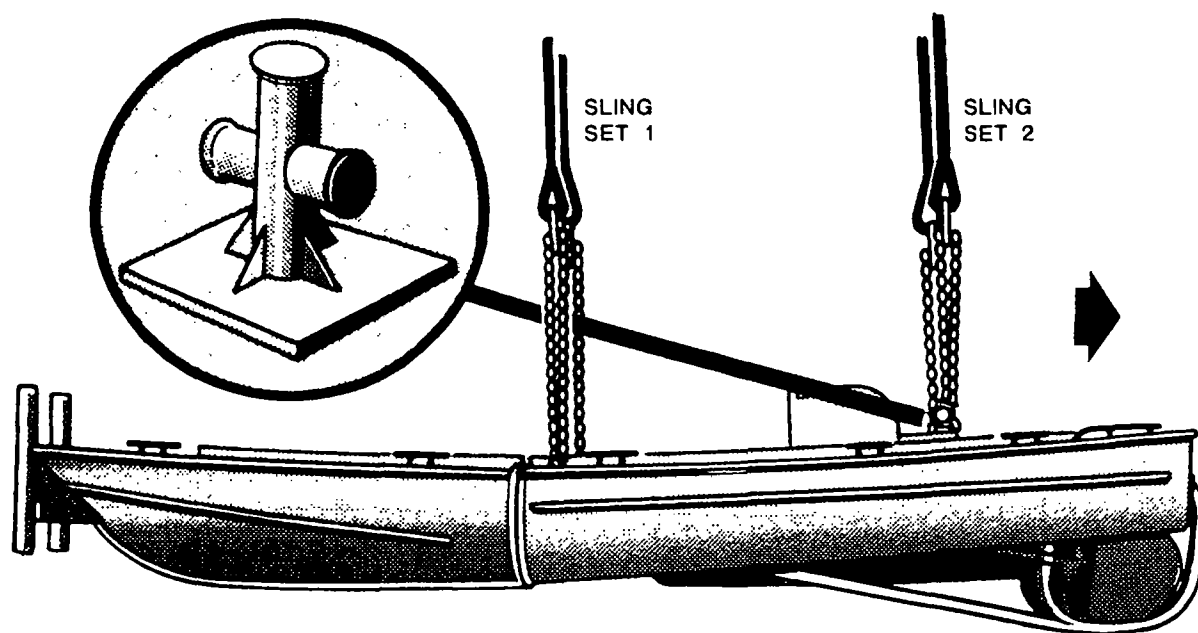


Figure 2-55. Water Purification Unit, Reverse Osmosis (ROWPU)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 90 knots.

LOAD DESCRIPTION

- Water purification unit, reverse osmosis, MC 257, 600 gph, skid-mounted, TAMCN B2064, NSN 4610-01-113-8651.
- Weight: 7,400 pounds.

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each), or
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Secure all containers, boxes, and other gear.
- Tape all glass fixtures to prevent breakage.

Step 2. Rigging

NOTE: The water pump end is designated as the forward end.

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outerload-carrying sling legs.

NOTE: Both sling sets use the same chain link count for this load.

- Forward sling set (2 sling legs):

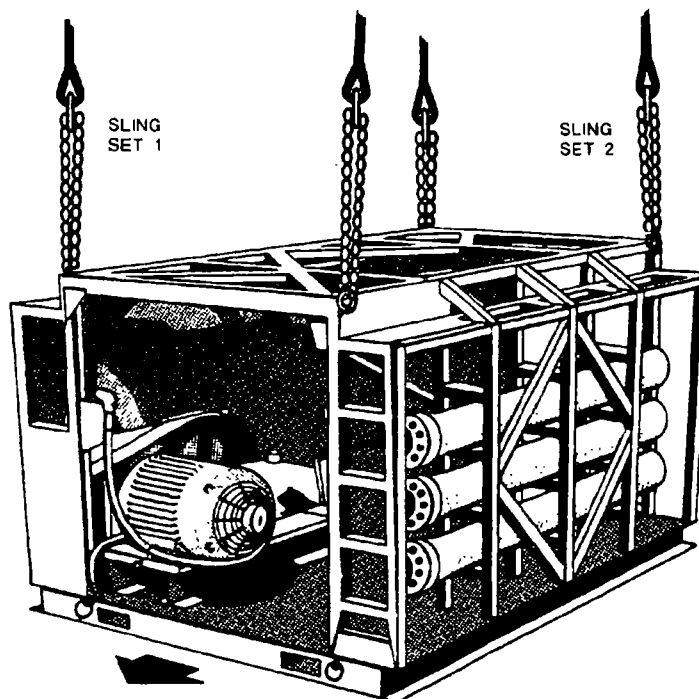
- Connect two sling leg assemblies to apex fitting number 1. Position the web ring/apex fitting on top of the generator end of the ROWPU unit.
- Loop the chain end of the left and right sling legs through their respective lift rings on top of the unit and insert link 5 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 2. Position the web ring/apex fitting on top of the other end.
 - Loop the chain end of the left and right sling legs through their respective lift rings on top of the unit and insert link 5 in the grab link.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the ROWPU unit to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on top of the unit. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the other end. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the unit and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-55.1. Extendable Boom Forklift (USMC)**

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Extendable boom forklift, TAMCN B2561.
- Weight: 25,640 pounds.

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (5,000-pound capacity) (2 each or as required).

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Secure the forks against the carriage using CGU-1/B tie-down strap.
- Raise the carriage 10 inches off the ground; retract and raise boom.
- Set the parking brake.
- Place the gear selector in neutral.
- Tape exhaust pipe end.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the falling objects protection system (FOPS).
 - Loop the chain end of the left and right sling legs through their respective lift provision located on the front of the forklift and insert link 3 in the grabhook.

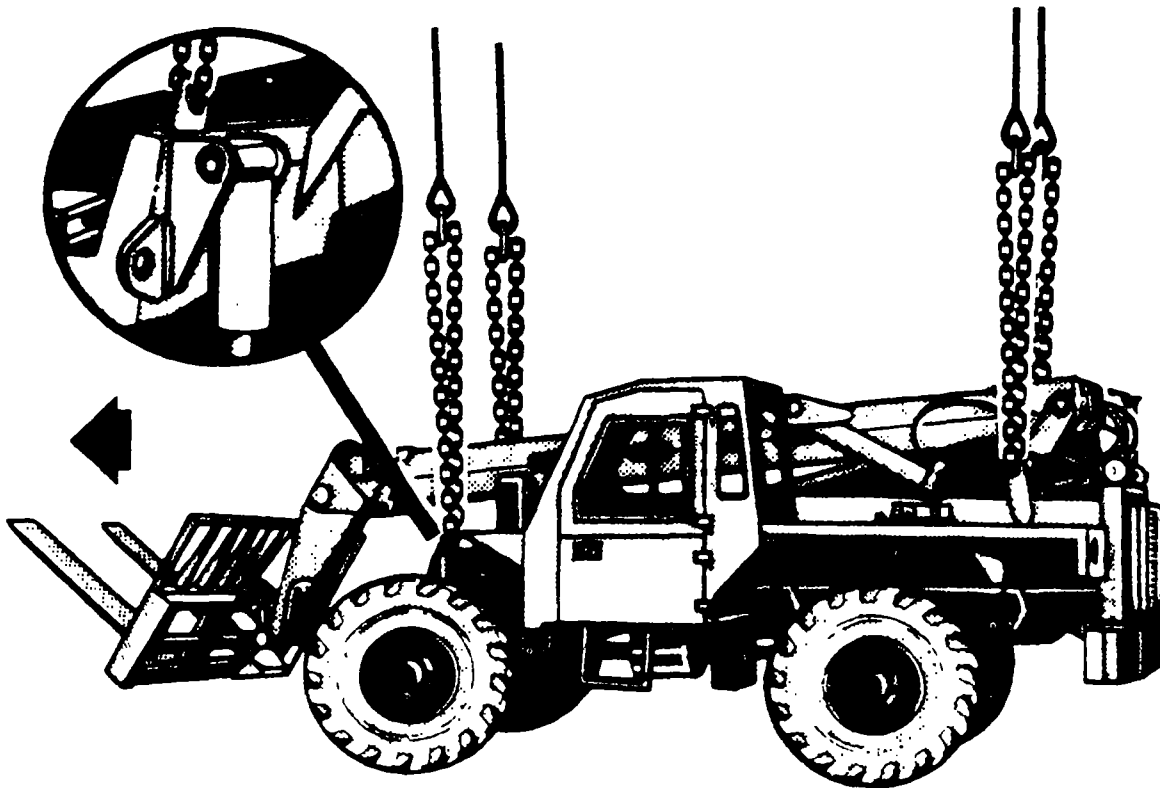
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting on top of the FOPS.
 - Loop the chain end of the left and right sling legs through their respective lift provision located on the rear of the forklift and insert link 40 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the FOPS to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The hookup team stands on the FOPS, facing aft. The static wand person discharges the static electricity with the static wand. The forward hookup person (apex fitting 1) places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the FOPS and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-55.2. RT4000 Forklift (USMC)**

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Forklift, rough terrain, 4,000-pound, TAMCN B2566.
- Weight: 10,860 pounds.

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each) or
- Sling set (40,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (5,000-pound capacity).

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Engage hand brake. Place transmission in neutral.
- Raise the fork tines approximately one foot above the ground. Lift the ends of the fork tines by hand to point upward and secure the fork tines to the lift cylinder frame using the tie-down strap.
- Tape the exhaust pipe end.

Step 2. Rigging

NOTE: The chain link number inside parentheses is used for the 40,000-pound capacity sling set.

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling leg to the two outer load-carrying sling leg.

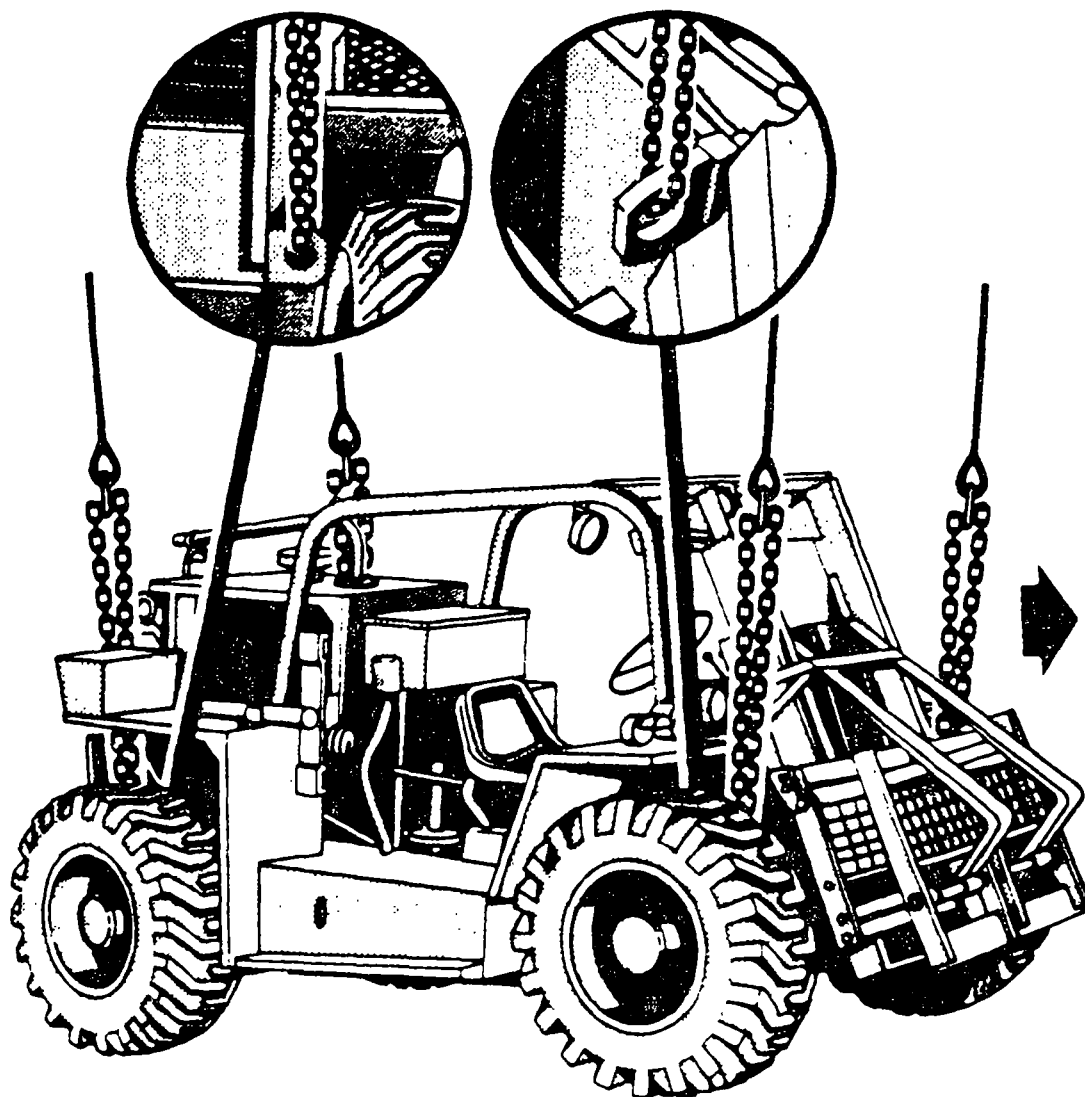
- **Forward sling set (2 sling legs):**
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the FOPS.
 - Loop the chain end of the left and right sling legs through their respective lift provision (not the tie-down provision) that is located directly above the forward axle housing between the left front tire and the hydraulic cylinder. Insert link 3 (3) in the grab link.
- **Aft sling set (2 sling legs):**
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting on top of the engine deck.
 - Loop the chain end of the left and right sling legs through their respective lift provision located above the rear winch and insert link 40 (30) in the grab link. Secure excess chain with tape or nylon cord.
- Pull the front sling leg up and tie or tape (breakaway technique) the grab links to the front side of the upper light brackets to ensure the sling legs do not become entangled.
- Pull the aft sling leg together on top of the engine compartment and tie or tape (breakaway technique) the two grab links together.
- Cluster and tie or tape (breakaway technique) the sling leg in each sling set on top of the forklift to prevent entanglement with the FOPS and/or air cleaner/exhaust during hookup and lift-off.

Step 3. Hookup

The forward hookup person (apex fitting 1) stands on the FOPS. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person (apex fitting 2) stands on the engine deck. The static wand person discharges the static electricity with the static wand. The aft hookup person places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the forklift and remains close to the load as the helicopter removes slack from the sling leg. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.





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Figure 2-56. Pneumatic Tool and Compressor Outfit

APPLICABILITY

- This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Pneumatic tool and compressor, air rotary, TAMCN B0395, NSN 3820-00-950-8584.
- Weight: 8,040 pounds.

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each), or
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Make sure all loose gear is properly stowed. Secure all hatches.
- Secure light cable to drawbar with tape or nylon cord.
- Tape all lights and glass fixtures/reflectors.
- Secure the two small wheels by taping over their adjustment pins.
- Set one of the two hand brakes.

Step 2. Rigging

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

NOTE: Both sling sets use the same chain link count for this load.

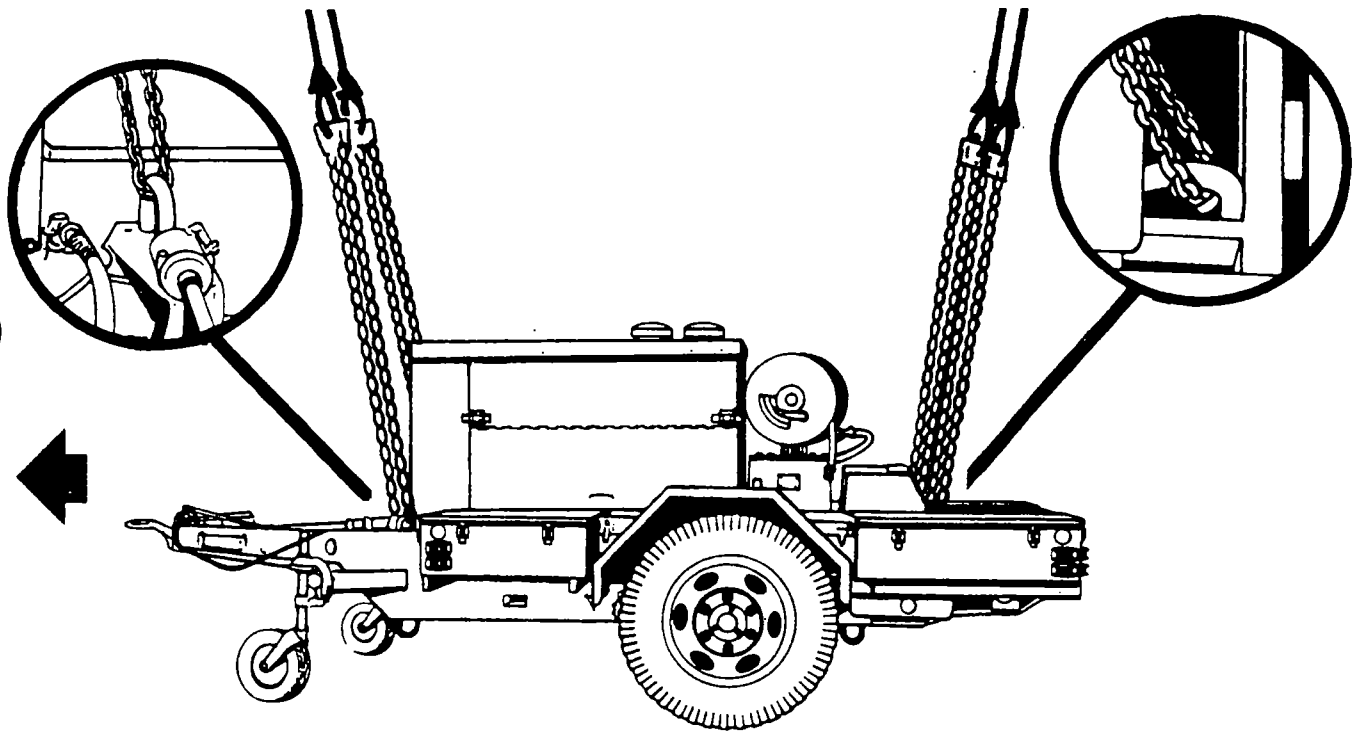
- **Forward sling set (2 sling legs):**
 - Connect two sling legs to apex fitting number 1.
 - Position the apex fitting/web ring on top of the compressor. Loop the chain end of the left and right sling legs through their respective short lifting eyes located at the front corners of the trailer and insert link 5 in the grab link.
- **Aft sling set (2 sling legs):**
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting/web ring on top of the compressor. Loop the chain end of the left and right sling legs through their respective tall lifting eyes located at the trailer corners and insert link 30 in the grab link. Secure excess chain with tape or nylon cord.
- **Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the compressor to prevent entanglement during hookup and lift-off.**

Step 3. Hookup

The forward hookup team (apex fitting 1) stands in front of the compressor. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands behind the compressor. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the compressor and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



LIQUID CONTAINERS

The certified dual-point rigging procedures for liquid containers are in this section. Figures 2-57 and 2-58 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-57. Two Storage Modules, Fuel/Water (Side-by-Side)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Two SIXCONs, storage module, fuel/water, side-by-side, TAMCN B2085/B2086, NSN 5430-01-240-4578/5430-01-203-9971.
- Weight: 20,000 pounds (this load is certified at full weight only).

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 5 minutes.

PROCEDURES

Step 1. Preparation

- Position the two modules side by side. Make sure that the ISO horizontal corner connectors are properly secured.
- Make sure that the storage tanks are either completely full or empty.
- Secure all hatches, hoses, valves, and loose gear.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1.

- Position the apex fitting on top of one end of the two modules. Loop the chain end of the left and right sling legs through the opening on the side of their respective ISO lifting provisions on the end of the module and out through the front opening. Insert link 3 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting on top of the other end of the two modules. Loop the chain end of the left and right sling legs through the opening on the side of their respective ISO lift provisions on the end of the module and out through the rear opening. Insert link 3 in the grab link.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the modules to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on one end of the module. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the other end of the modules. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the modules and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

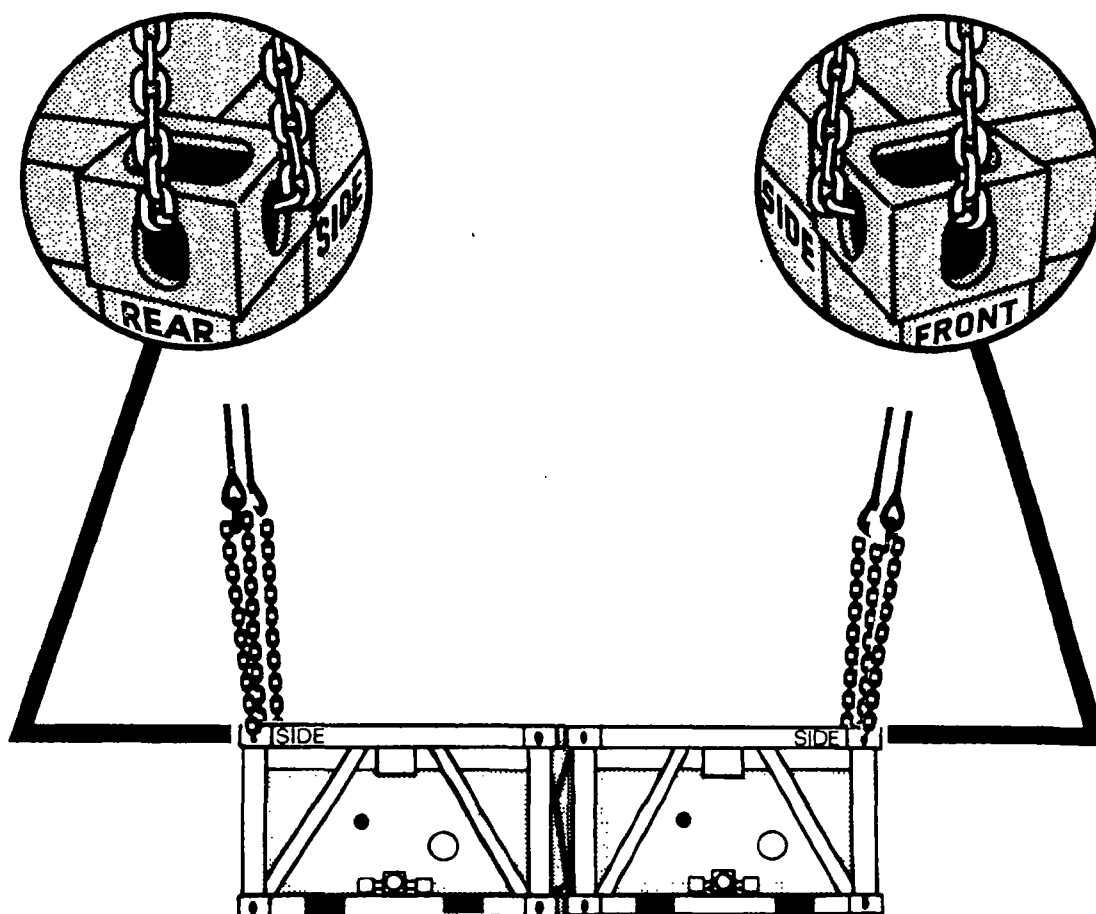


Figure 2-58. Two Storage Modules, Fuel/Water and One Pump Module

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Two SIXCONs, storage module, fuel/water, TAMCN B2085/B2086, NSN 5430-01-240-4578/5430-01-203-9971.
- One SIXCON, pump module, fuel/water, TAMCN B1580/B1581, NSN 4930-01-240-4579/4320-01-156-3873.
- Weight: 22,480 pounds (this load is certified with the storage modules at full weight only).

MATERIALS

- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Position the pump module between the two storage modules. Make sure that all the ISO horizontal corner connectors are properly secured.
- Make sure that the storage tanks are either completely full or empty.
- Secure all hatches, hoses, valves, and loose gear.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1.
 - Position the apex fitting on top of the outboard end of a storage module. Loop the chain end of the left and right sling legs through the opening on the side of their

respective ISO lifting provision and out through the front opening. Insert link 3 in the grab link.

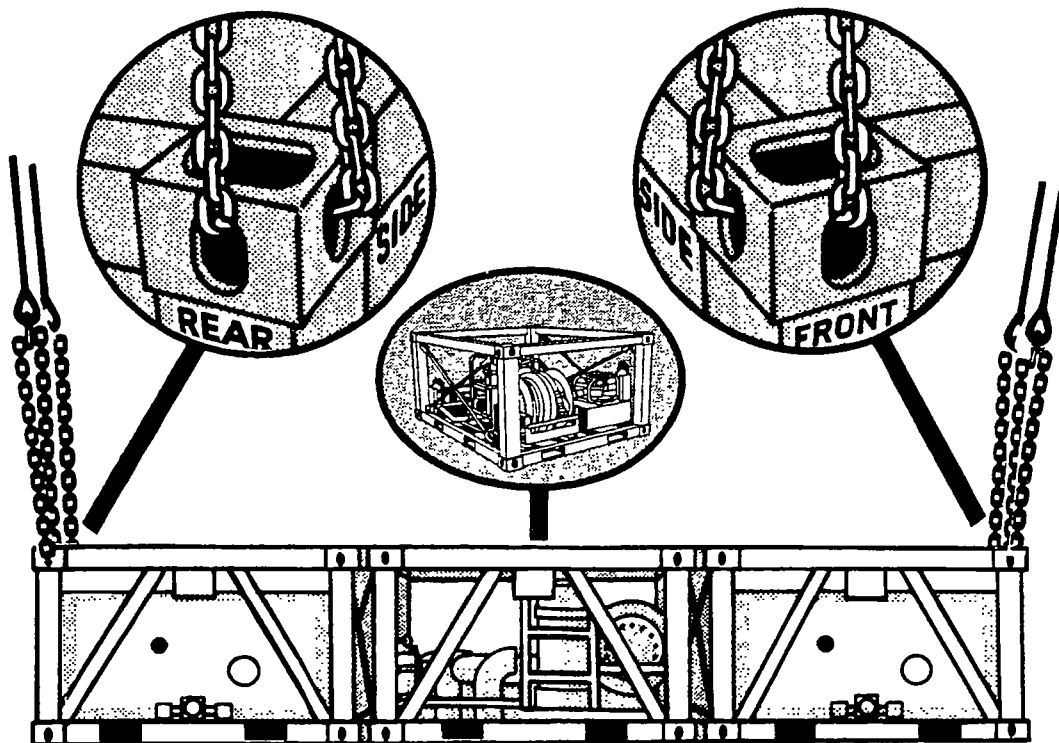
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2).
 - Position the apex fitting on top of the outboard end of the other storage module. Loop the chain end of the left and right sling legs through the opening on the side of their respective ISO lift provision and out through the rear opening. Insert link 3 in the grab link.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the modules to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on top of one of the storage modules. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on top of the other storage module. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the SIXCONs and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



SHELTERS

The certified dual-point rigging procedures for shelters are in this section. Figures 2-59 through 2-68 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-59. AN/TSQ-146(V) Multiplexer Terminal Set

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- AN/TSQ 146(V) multiplexer terminal set, NSN 5895-01-188-8681.
- Weight: 6,190 pounds.

MATERIALS

- Sling set (10,000-pound, capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Items that are not a component of AN/TSQ-146(V) must not be loaded inside the set during airlift. Secure all loose equipment inside the set with tape or nylon cord as required.
- Close and secure all doors, vents, and fans with tape or nylon cord.
- Make sure that the environmental control unit (ECU) panels are secured with tape or nylon cord.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position apex fitting above the door end of the shelter.

- Loop the chain end of the left and right sling legs through their respective lift provisions located on the shelter corners and insert link 5 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position apex fitting on top of the ECU end of the shelter.
 - Loop the chain end of the left and right sling legs through their respective lift provisions and insert link 50 in the grabhook. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

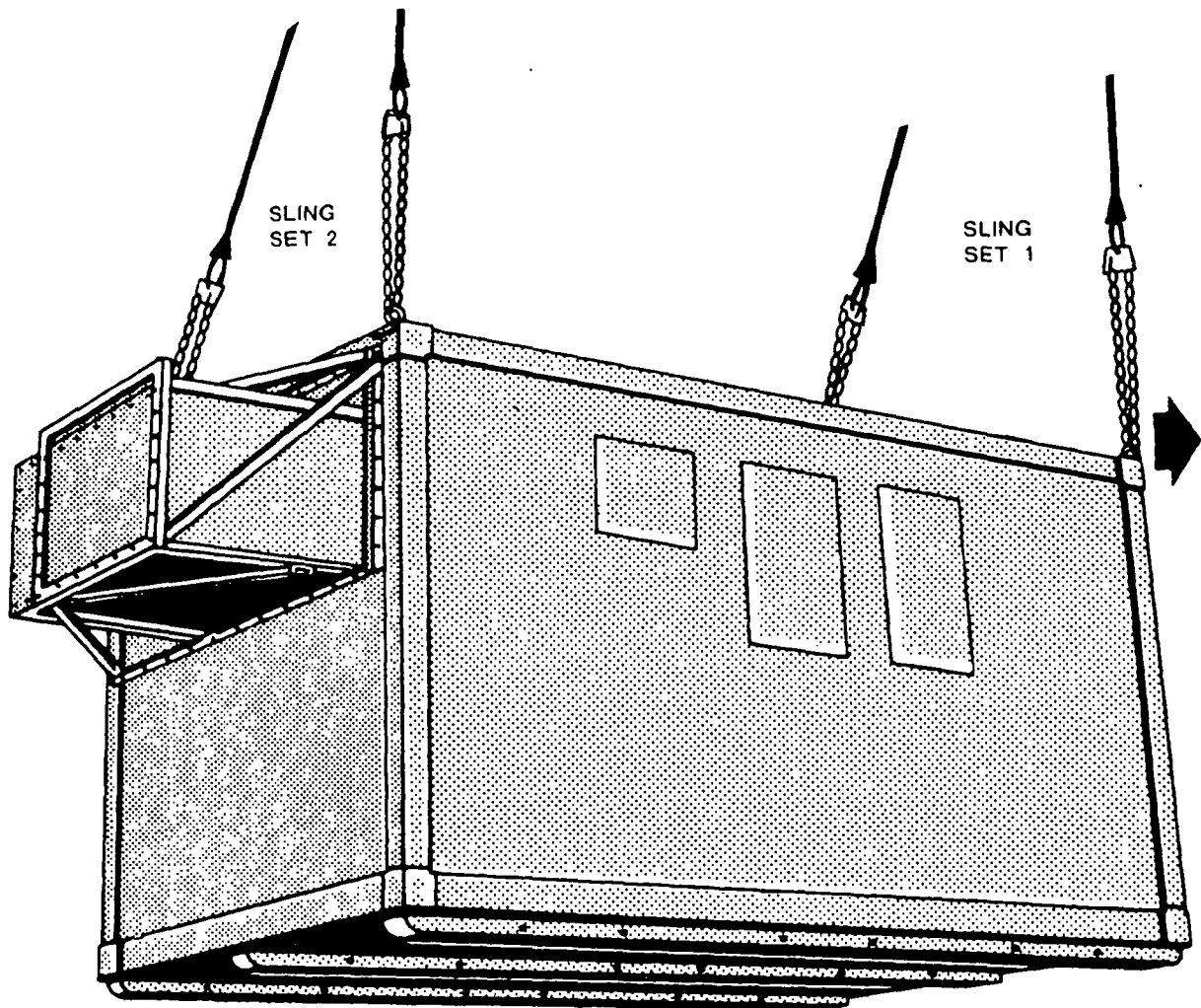
NOTE: Connect the apex fittings so the shelter is carried door forward.

The hookup team stands on top of the shelter. The static wand person discharges the static electricity with the static wand. One hookup person places apex fitting 1 onto the forward cargo hook. The other hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the top of the terminal set and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

CAUTION: Brief the helicopter crew to relax sling leg tension and hover to the side of the load when releasing the apex fittings. Damage may occur to the roof of the set if the apex fitting is dropped on the shelter roof.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



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Figure 2-60. Communications or Electronic Systems Housed in S-250 Shelters

APPLICABILITY

The following system is mounted in an S-250 shelter and is certified by the US Army NRDEC for the identified helicopters up to the airspeeds denoted below.

LOAD DESCRIPTION

- AN/TSC-93B(V)1, tactical satellite terminal:
 - LIN S34895.
 - Weight: 3,250 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 100 knots.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig each load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Secure all loose equipment inside the shelter with tape or nylon cord.
- Close and secure all hatches, vents, and access doors.
- Secure any external hoses, cables, ladders, and power unit components with tape or nylon cord.
- Secure the ECU panels with tape or nylon cord. Check the bolts that attach the ECU to the ECU frame for security.

Step 2. Rigging

NOTE: Either the shelter door end or the ECU end is designated as the forward end for rigging purposes and varies depending on shelter contents. The corner lift provisions

(identified in the illustration) and the forward end are identified in the chart that follows.

- Forward sling set (2 sling legs):

- Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the shelter end that is identified as the forward end in the chart.
- Loop the chain end of the left and right sling legs through their respective lift provision located on the corners of the shelter and insert the link identified in the chart in the grabhook.

- Aft sling set (2 sling legs):

- Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting on top of the other end of the shelter.
- Loop the chain end of the left and right sling legs through their respective lift provision located on the corners of the shelter and insert the link identified in the chart in the grabhook.

SHELTER	FORWARD END	TYPE OF SLING SET	CORNER LIFTING PROVISIONS			
			1	2	3	4
AN/TSC-93B(V)1	ECU	10,000-pound	33	33	3	3

- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the shelter to prevent entanglement during hookup and lift-off.

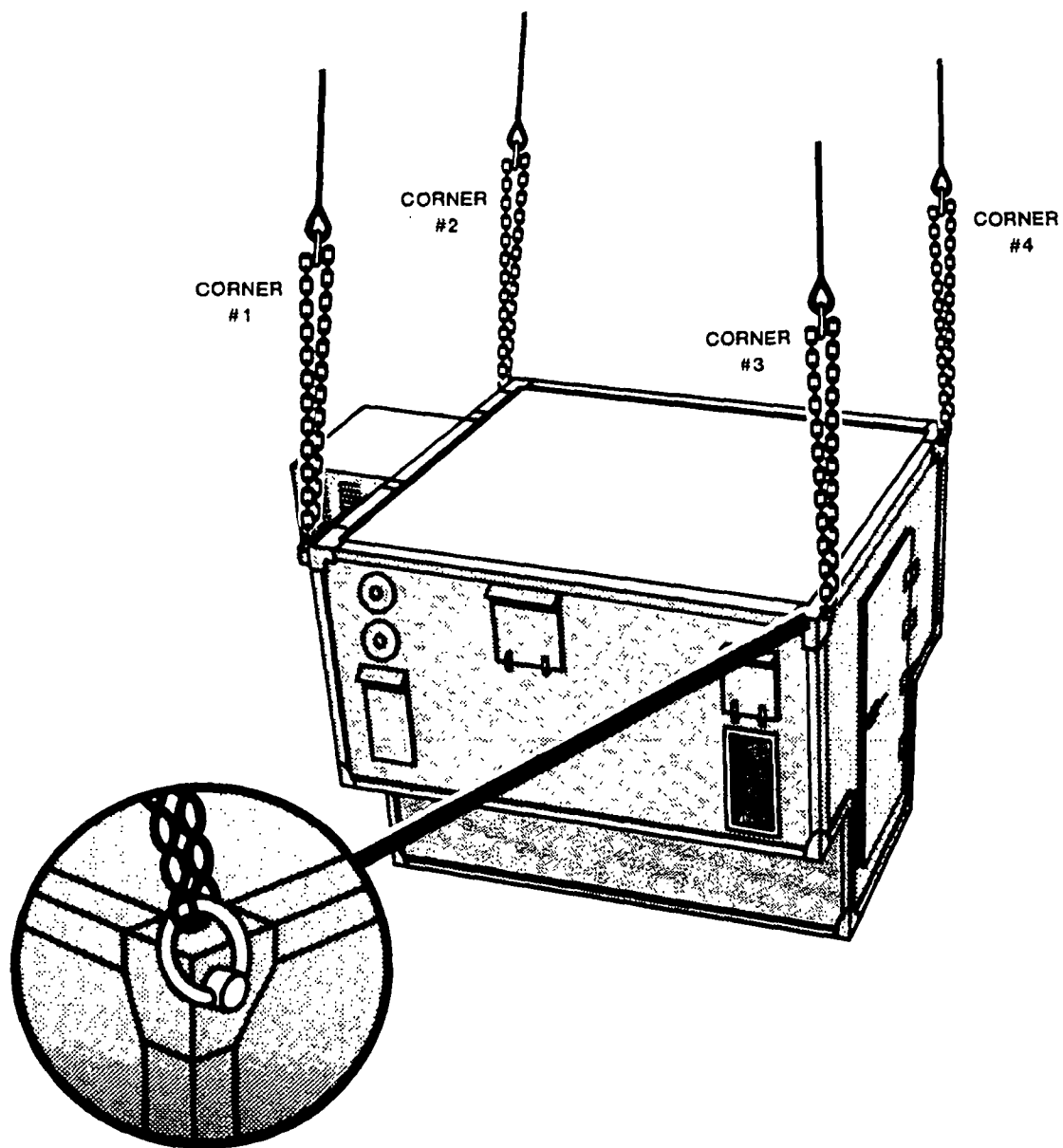
Step 3. Hookup

NOTE: Brief the pilot to relax sling leg tension and hover to the side of the load when releasing the apex fitting/web ring to prevent damage to the top of the shelter.

The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the shelter forward end and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands on the other end of the shelter and places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the shelter and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-61. AN/TSC-85B Communications or Electronic Systems Housed in S-280 Shelters**

APPLICABILITY

The following systems are mounted in S-280 shelters and are certified by the US Army NRDEC for the identified helicopters up to the airspeeds denoted below.

LOAD DESCRIPTION

- AN/TSM-133, battery servicing shelter:
 - LIN S10034.
 - Weight: 5,240 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 130 knots.
- AN/TRC-138A, repeater set radio:
 - NSN 5820-01-161-9419.
 - Weight: 4,720 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 80 knots.
- AN/TRC-173, radio terminal set:
 - LIN R39452.
 - Weight: 3,790 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 80 knots.
- AN/TRC-174, repeater set radio:
 - LIN R39520.
 - Weight: 4,100 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 80 knots.
- AN/TRC-175, radio terminal set:
 - LIN R39588.

- Weight: 4,690 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 80 knots.
- AN/TRC-179(V)1, regency set force terminal:
 - NSN 5895-01-156-0411.
 - Weight: 8,200 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 110 knots.
- Meteorological data system (MDS) shelter:
 - Weight: 4,750 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 130 knots.
- AN/TSQ-129, position location reporting system master station:
 - Weight: 6,050 pounds.
 - Type helicopter: CH-53E.
 - Airspeed: 55 knots.
- AN/TSQ-158, enhanced position location reporting system net control station:
 - Weight: 6,289 pounds.
 - Type helicopter: CH-53E.
 - Airspeed: 55 knots.
- AN/TSC-85B, tactical satellite communications terminal:
 - LIN S5224.2; NSN 5895-01-042-9859.
 - Weight: 6,200 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 100 knots.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Multileg sling set (15,000-pound capacity) (2 each).

- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig each load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Secure all loose equipment inside the shelter with nylon cord or tape.
- Close and secure all hatches, vents, and access doors.
- Secure any external hoses, cables, ladders, and power unit components with nylon cord or tape.
- Secure the environmental control unit (ECU) panels with tape or nylon cord. Check bolts that attach the ECU to the ECU frame for security.

Step 2. Rigging

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

NOTE: Either the shelter door end or the ECU end is designated as the forward end for rigging purposes and varies depending on shelter contents. The corner lift provisions (identified in the illustration) and the forward end are identified in the chart that follows.

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting/web ring on top of the shelter end that is identified as the forward end in the chart.
 - Loop the chain end of the left and right sling leg through their respective lift provision located on the corner of the shelter and insert the link identified in the chart in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting/web ring on top of the other end of the shelter.
 - Loop the chain end of the left and right sling leg through their respective lift provisions located on the corner of the shelter and insert the link identified in the chart in the grabhook.

SHELTER	FORWARD END	TYPE OF SLING SET	CORNER LIFTING PROVISIONS			
			1	2	3	4
AN/TSM-133	Door	10,000 pound	30	30	3	3
AN/TRC-138A	ECU	10,000 pound	3	3	32	32
AN/TRC-173	ECU	10,000 pound	3	3	32	32
AN/TRC-174	ECU	10,000 pound	3	3	32	32
AN/TRC-175	ECU	10,000 pound	3	3	32	32
AN/TRC-179(V)1	ECU	10,000 pound	30	30	3	3
MDS	ECU	10,000 pound	3	3	35	35
AN/TSQ-129	ECU	15,000 pound	3	3	25	25
AN/TRC-158	ECU	10,000 pound	3	3	33	33

- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the shelter to prevent entanglement during hookup and lift-off.
- When rigging is complete, tie the lift rings upward by running 550-cord diagonally across the shelter roof to the lift rings. Ensure that the lift rings lay against the top edges of the shelter. Ensure that the 550-cord runs below the sling so that they are not fouled during hookup.

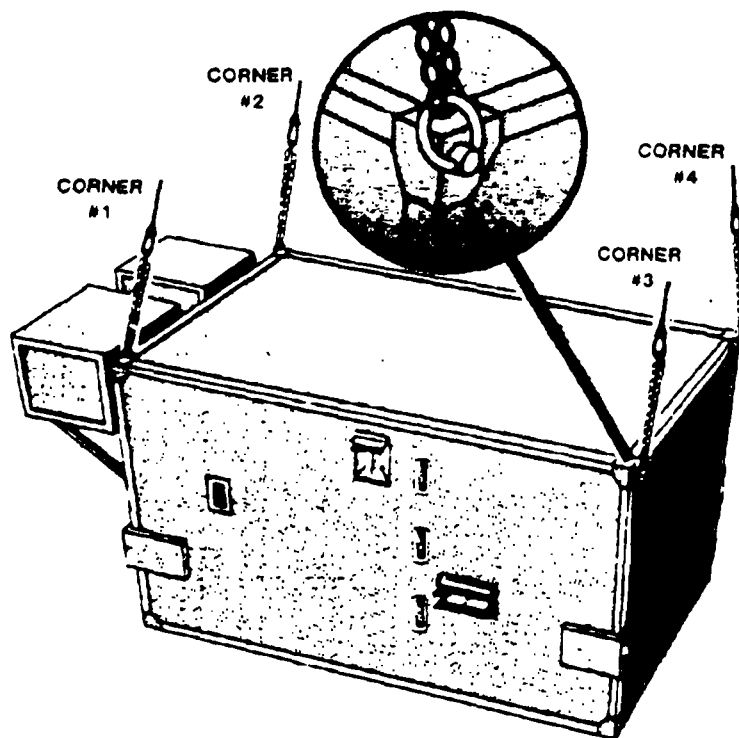
Step 3. Hookup

NOTE: Brief the pilot to relax sling leg tension and hover to the side of the load when releasing the apex fitting/web ring to prevent damage to the top of the shelter.

The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the shelter forward end and places apex fitting/web ring 1 onto the forward cargo hook. The aft hookup person stands on the other end of the shelter and places apex fitting/web ring 2 onto the aft cargo hook. The hookup team then carefully dismounts the shelter and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.





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Figure 2-62. AN/TSQ-111 Communications Nodal Control Element (CNCE)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Communications nodal control element (CNCE) AN/TSQ-111, NSN 5895-01-188-8682.
- Weight: 10,000 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.

PERSONNEL

Two persons can prepare and rig the load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Secure all loose equipment inside the shelter.
- Close and secure all vents, hatches, and doors, using tape or nylon cord as necessary.
- Tape over rope lashing points located close to corner lift points to prevent the sling legs from entangling during lift-off.

Step 2. Rigging

NOTE: The door end is designated as the front of the load.

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the door end of the shelter.
 - Loop the chain end of the left and right sling legs through the respective lifting rings located on the corners of the shelter and insert link 3 in the grabhook.
- Aft sling set (2 sling legs):

- Connect two sling legs to apex fitting number 2. Position the apex fitting on top of the ECU end of the shelter.
- Loop the chain end of the left and right sling legs through the respective lifting rings located on the corners of the shelter and insert link 24 in the grabhook. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together on top of the shelter to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Do not allow sling legs to become entangled around rope lashing points located near the lift points, as damage may occur to either the nylon portion of the sling leg or to the lashing point of the shelter.

NOTE: Connect the apex fittings so the shelter is carried door end forward.

The hookup team stands on top of the shelter. The static wand person discharges the static electricity with the static wand. One hookup person (door end) places apex fitting 1 onto the forward cargo hook. The other hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team dismounts and remains close to the load as the helicopter removes slack in the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

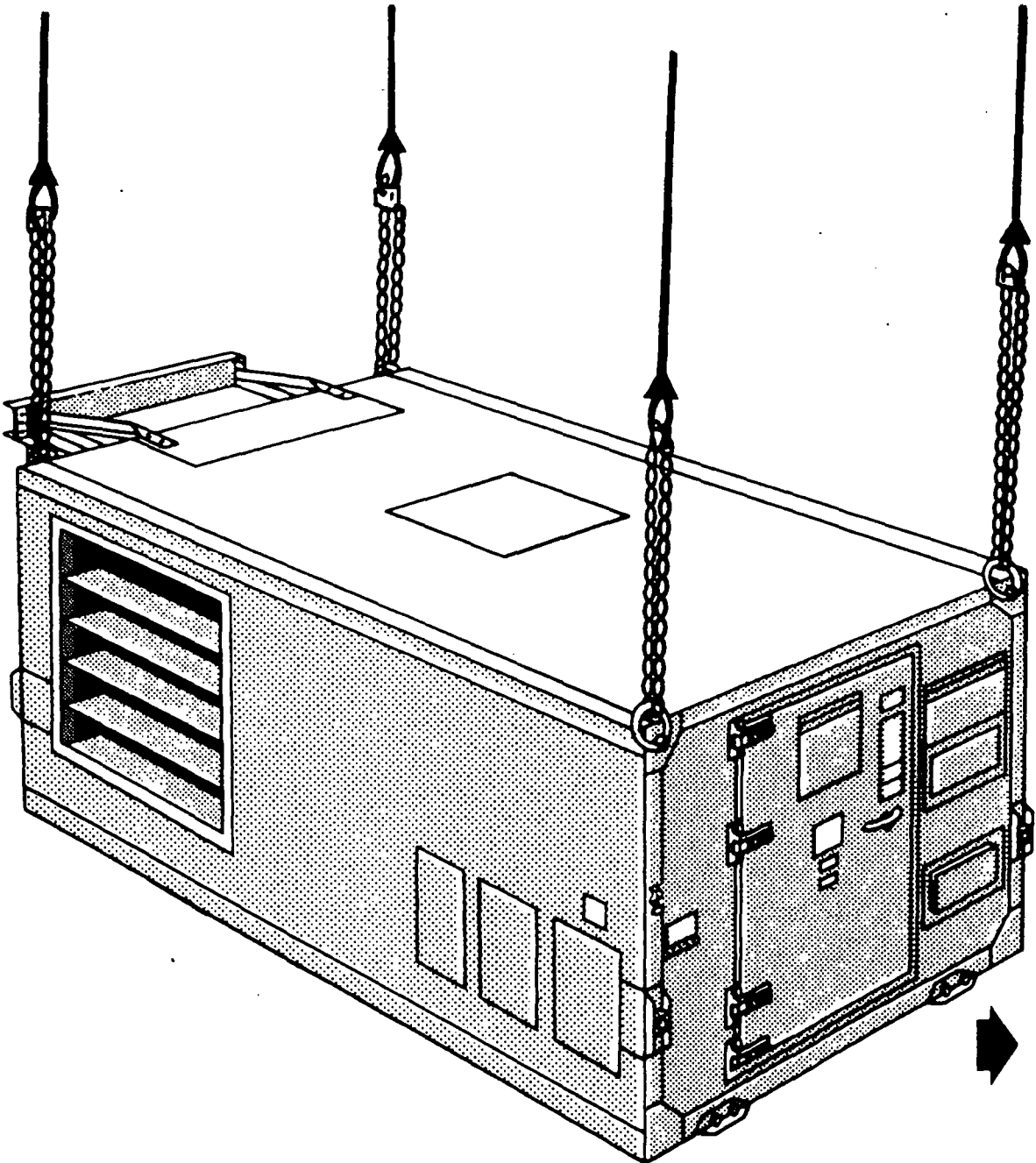


Figure 2-63. Jam-Resistant Secure Communications (JRSC) Satellite Communications Terminal

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 60 knots.

LOAD DESCRIPTION

- Jam-resistant secure communications (JRSC) satellite communications terminal housed in a modified S-280 shelter, LIN G60504.
- Weight (with mobilizer): 20,730 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Tubular nylon, 1/2-inch, 1,000-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Raise and stow mobilizer wheels.
- Stow mobilizer tongue in up position using safety chain and nylon cord. Secure hoses to trailer tongue with nylon cord. Secure jack handles in position with nylon cord.
- Using 1/2-inch tubular nylon, secure the mobilizer wheel assemblies to the shelter lift eyes. Route an end of the nylon through the cutout in the mobilizer wheel rim and pass it through the shelter lift eye. Tie ends together with a square knot.
- Close and secure all doors, vents, and caps.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Place apex fitting on top of door end of shelter.

- Loop the chain end of the left and right sling legs through their respective lift provisions located at the top corners of the door end of the shelter and insert link 10 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 2. Place apex fitting on top of the other end of the shelter.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located at the top corners of the shelter and insert link 30 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the shelter to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The hookup team stands on top of the shelter. The static wand person discharges the static electricity with the static wand. The forward hookup person (door end) places apex fitting number 1 onto the forward cargo hook. The aft hookup person places apex fitting number 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the shelter and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

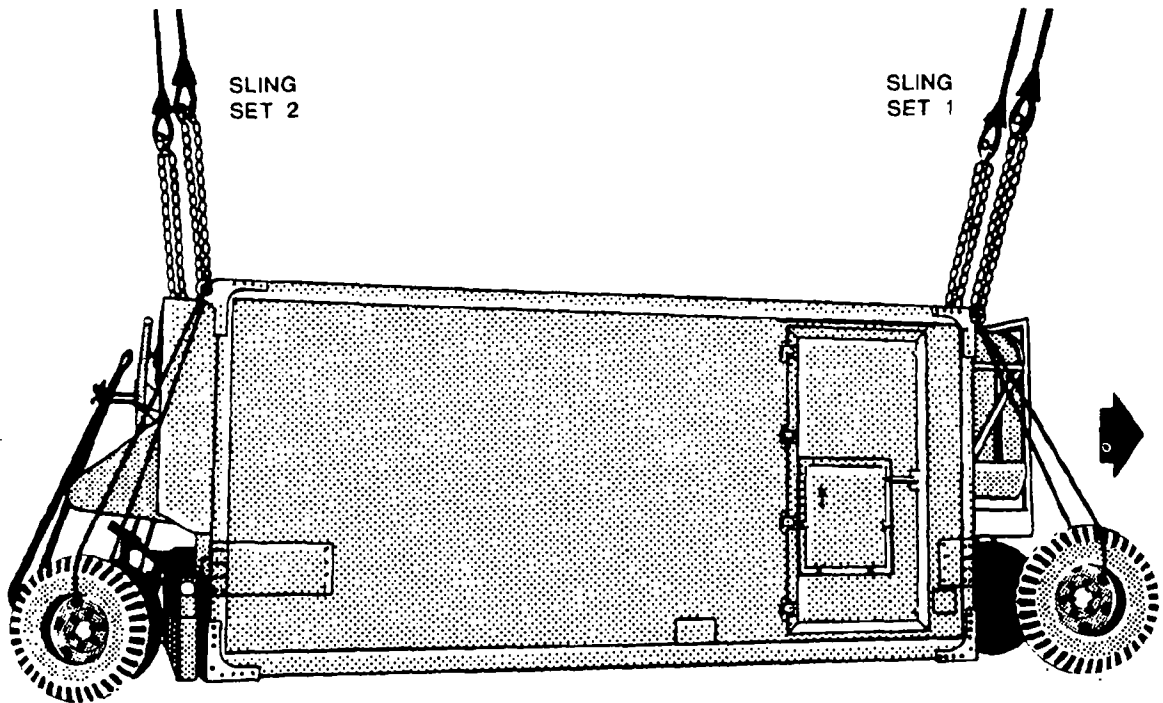


Figure 2-64. 8- x 8- x 10-Foot Shelter, EMI

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 50 knots.

LOAD DESCRIPTION

- Shelter, EMI, 8- x 8- x 10-Foot, TAMCN C6110, NSN 5411-01-206-6079.
- Weight: 7,700 pounds (this load is certified at full weight only).

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each), or
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Secure all loose equipment inside the shelter with tape or nylon cord.
- Secure the door in the closed/locked position.

Step 2. Rigging

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

- Forward sling set (sling set #1):
 - Position the web ring on top of the personnel door end of the shelter.
 - Loop the chain end of the left and right sling legs through the opening on the side of their respective ISO lift provisions and out through the front opening. Insert link 5 in the grab link.
- Aft sling set (sling set #2):

- Position the web ring on top of the rear end of the shelter.
- Loop the chain end of the left and right sling legs through the opening on the side of their respective ISO lift provisions and out through the rear opening. Insert link 5 in the grab link.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the shelter to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Advise the pilot to relax sling leg tension and hover to the side of the load when releasing the web rings to prevent damage to the top of the shelter.

The forward hookup team (sling set #1) stands on the personnel door end of the shelter. The static wand person discharges the static electricity with the static wand. The hookup person places web ring 1 onto the forward cargo hook. The aft hookup team (sling set #2) stands on the other end of the shelter. The static wand person discharges the static electricity with the static discharge wand. The hookup person places web ring 2 onto the aft cargo hook. The hookup teams then carefully dismount the shelter and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

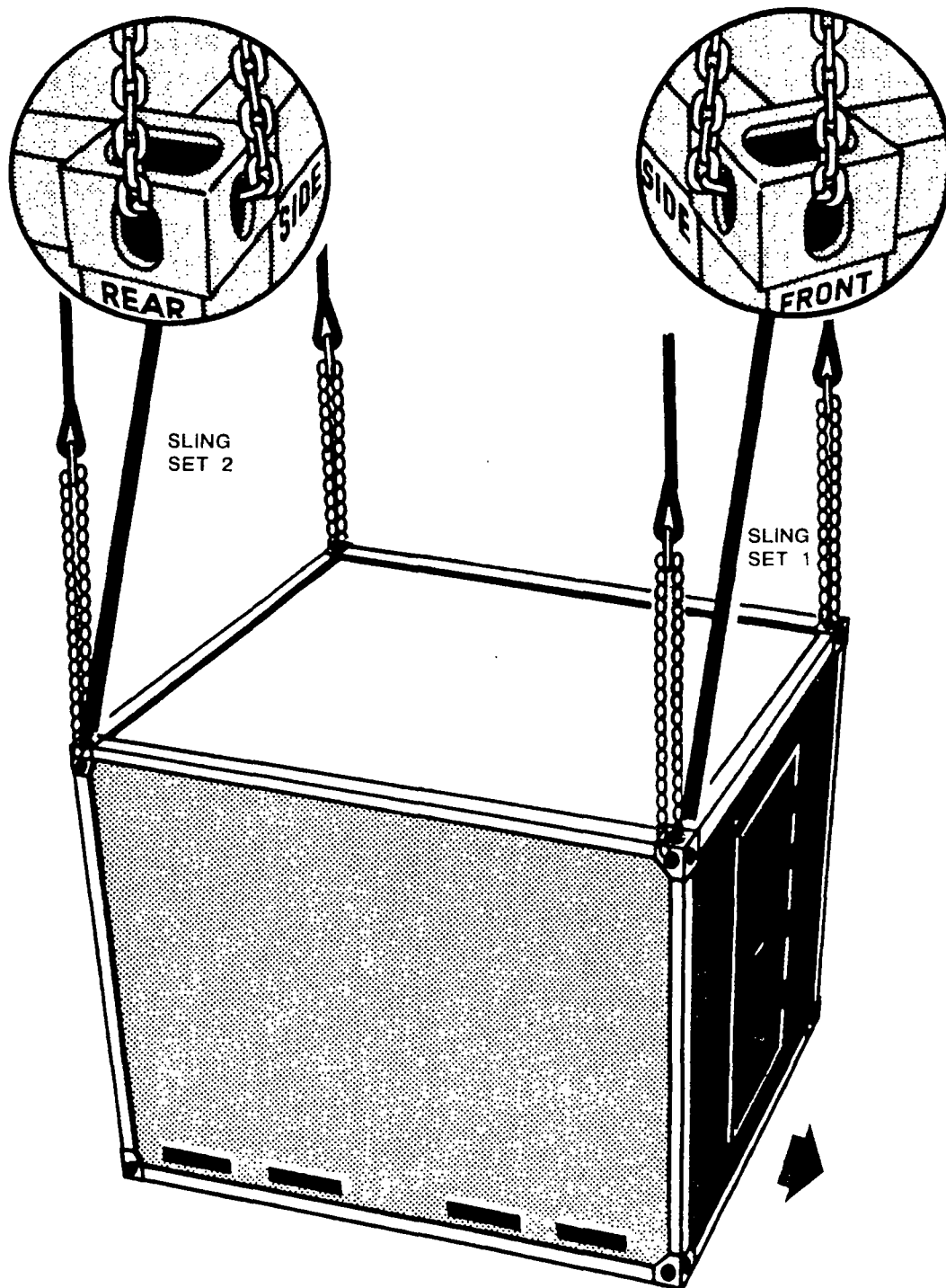


Figure 2-65. Improved Direct Air Support Center Shelter

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 90 knots when rigged with the 15,000-pound multileg sling set and 70 knots when rigged with the 40,000-pound sling set.

LOAD DESCRIPTION

- Improved direct air support center (IDASC) shelter, TAMCN A0512, NSN 5820-01-256-1634.
- Weight: 10,000 pounds (this load is certified at full weight only).

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each), or
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Make sure loose equipment in the shelter is secured or removed.
- Secure the door in the closed/locked position.

Step 2. Rigging

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

NOTE: Both sling sets use the same chain link count for this load.

- Forward sling set (2 sling legs):

NOTE: The single personnel door is designated as the front end of the load.

- Connect two sling leg assemblies to apex fitting number 1. Position the apex fitting on top of the front end of the shelter.
- Loop the chain end of the left sling leg through the lift provision on the left front corner of the shelter and insert link 9 in the grab link.
- Loop the chain end of the right sling leg through the lift provision on the right front corner of the shelter and insert link 3 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting on top of the rear end of the shelter.
 - Loop the chain end of the left sling leg through the lift provision on the left rear corner of the shelter and insert link 9 in the grab link.
 - Loop the chain end of the right sling leg through the lift provision on the right rear corner of the shelter and insert link 3 in the grab link.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the shelter to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on top of the personnel door end of the shelter. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the other end of the shelter. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the shelter and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

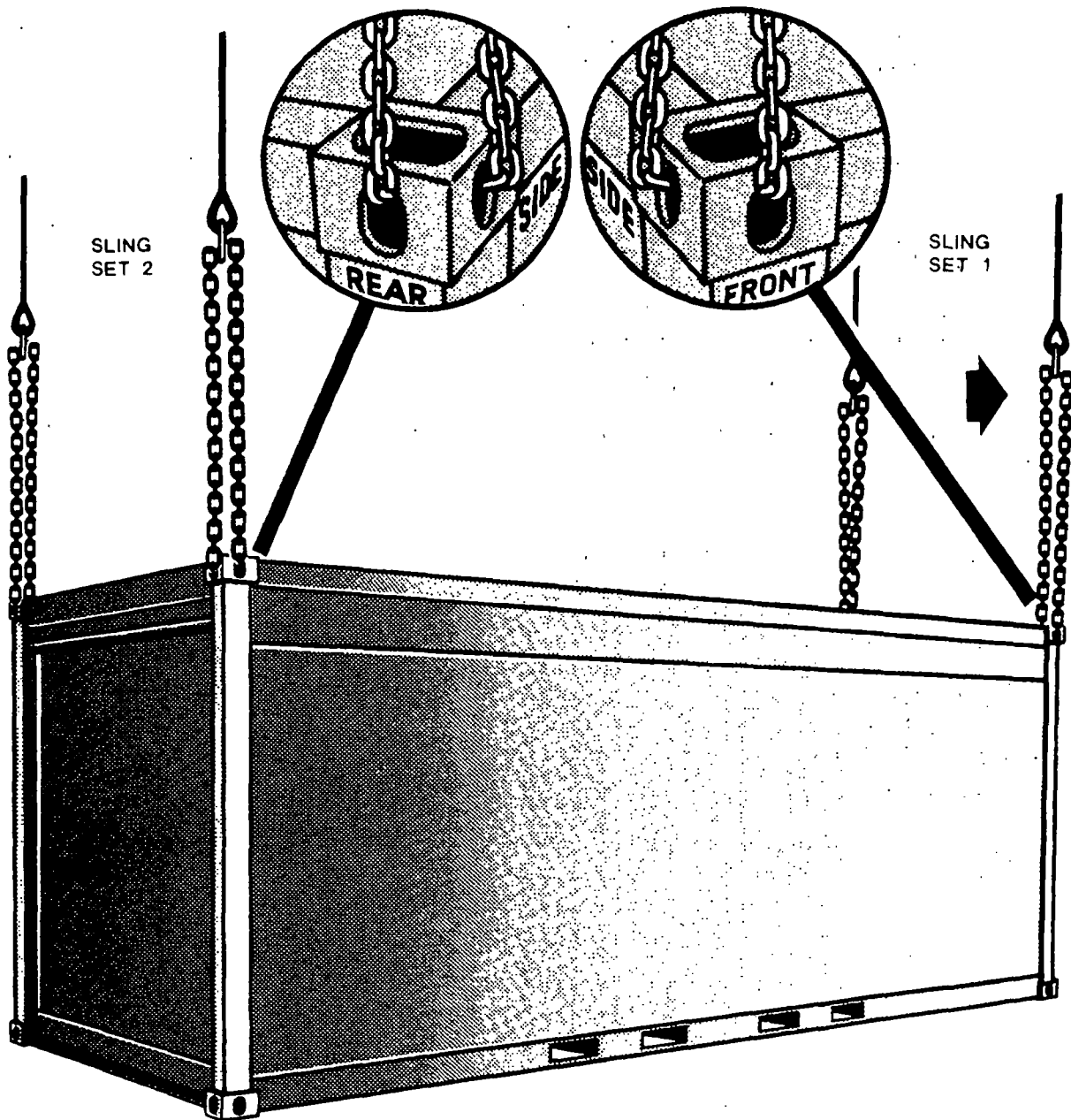


Figure 2-66. Shelter, Knockdown, 8- x 8- x 20-Foot

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 110 knots when rigged with the 15,000-pound capacity multileg sling set and 120 knots when rigged with the 40,000-pound capacity sling set.

LOAD DESCRIPTION

- Shelter, knockdown, 8- x 8- x 20-foot, TAMCN C6115, NSN 5411-01-206-6077.
- Weight: 3,800 pounds.

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each), or
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 5 minutes.

PROCEDURES

Step 1. Preparation

- Make sure that the shelter is properly knocked down and secured.
- Secure the knockdown shelter corner pins with tape.

Step 2. Rigging

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

NOTE: Both sling sets use the same chain link count for this load.

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1. Position the apex fitting/web ring on top of the front end of the shelter.

- Loop the chain end of the left and right sling legs through the opening on the side of their respective ISO lifting provision openings and out the front opening. Insert link 5 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting on top of the rear end of the shelter.
 - Loop the chain end of the left and right sling legs through the opening on the side of their respective ISO lifting provision openings and out the rear opening. Insert link 10 in the grab link.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the shelter to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on top of the shelter. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on top of the other end. The static wand person discharges the static electricity with the static discharge wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the shelter and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

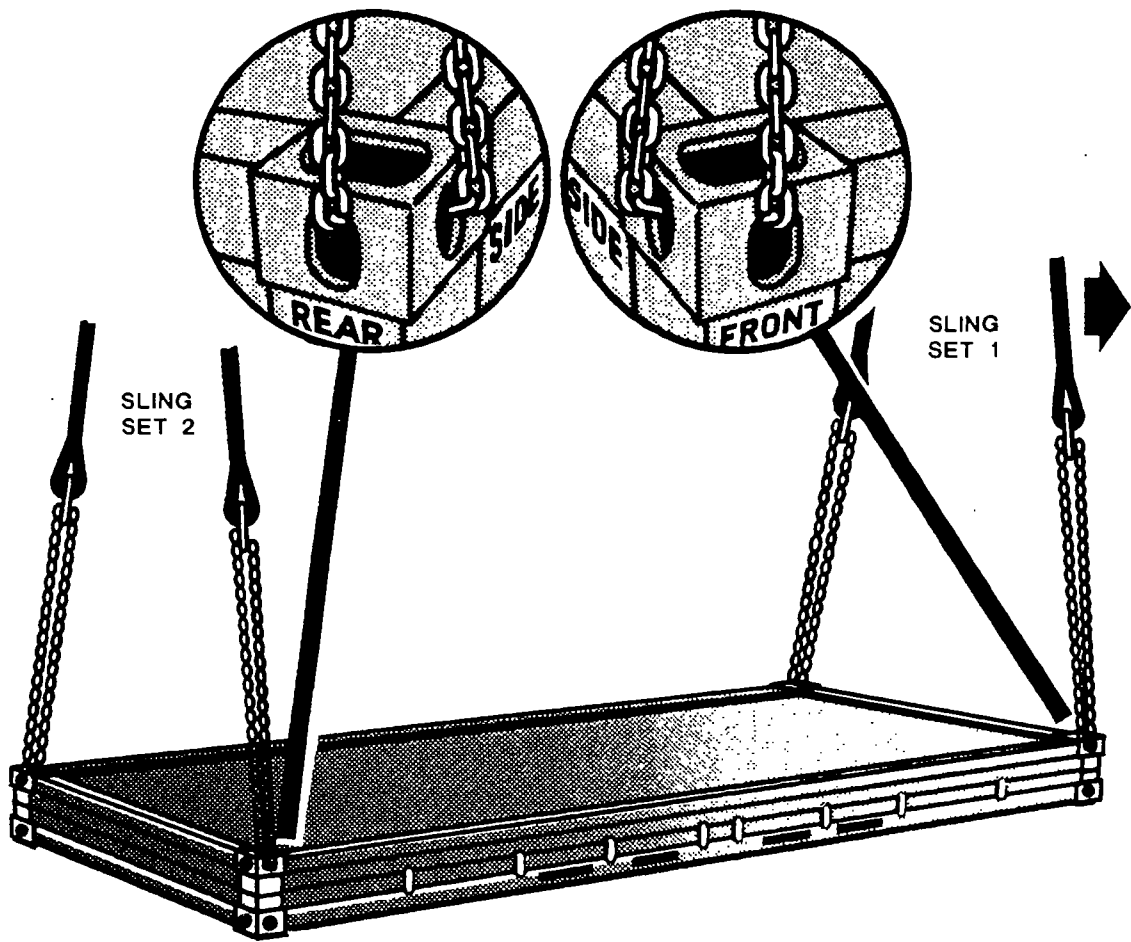


Figure 2-67. AN/TYC-5A Data Communications Terminal

APPLICABILITY

This load is certified by the US Army NRDEC for CH-53E helicopters at airspeeds up to and including 50 knots.

LOAD DESCRIPTION

- AN/TYC-5A data communications terminal, TAMCN A0437, NSN 5895-00-253-8955.
- Weight: 7,451 pounds.

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each), or
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 5 minutes.

PROCEDURES

Step 1. Preparation

- Secure all loose equipment inside the shelter with tape or nylon cord.
- Secure all latches and doors in the closed/locked position with tape or nylon cord.
- Remove the transporter dolly lift sets if attached to the shelter.

Step 2. Rigging

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

- Forward sling set (number 1):
 - Position the web ring on top of the front (door end) of the shelter.
 - Loop the chain end of the left and right sling legs through their respective lift provisions on the front corners and insert link 5 in the grab link.
- Aft sling set (number 2):

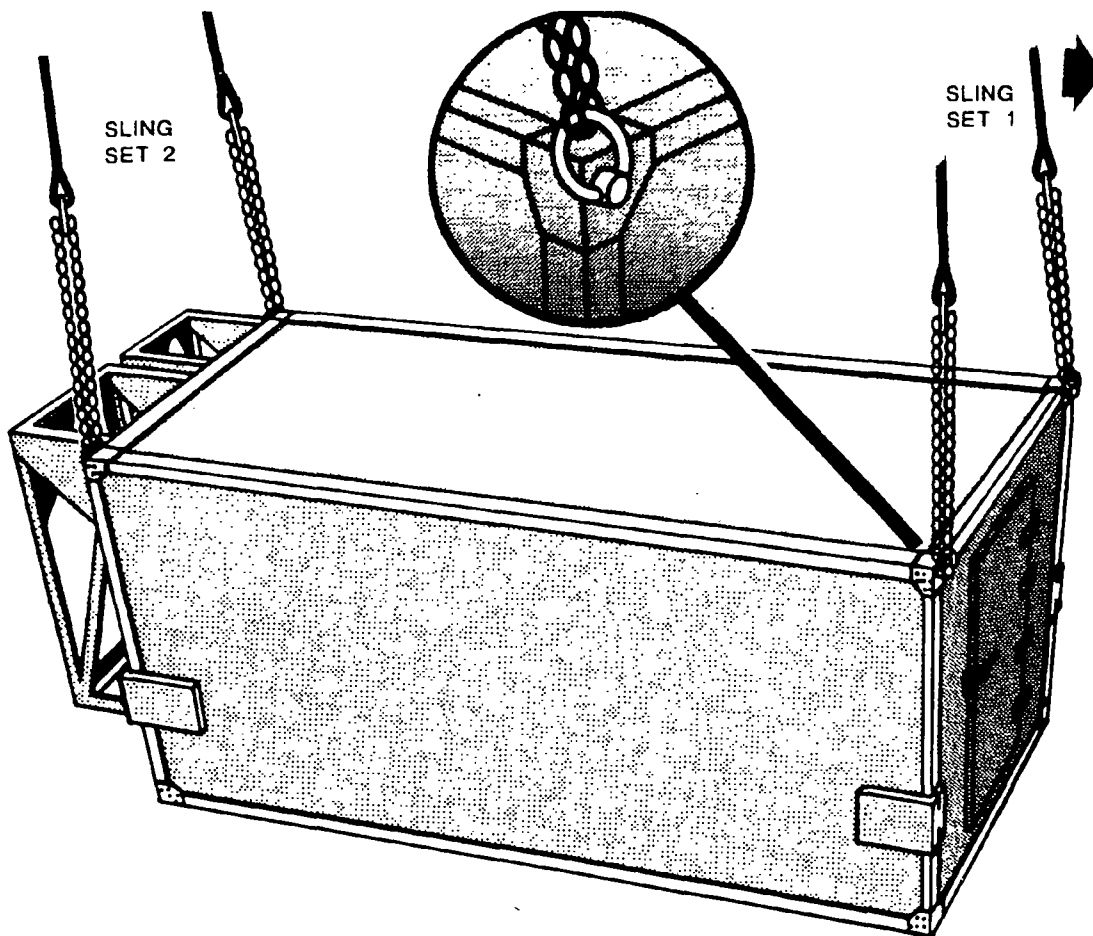
- Position the web ring on top of the other end of the shelter.
- Loop the chain end of the left and right sling legs through their respective lift provisions on the rear corners and insert link 20 in the grab link. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the shelter to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (sling set 1) stands on top of the door end. The static wand person discharges the static electricity with the static wand. The hookup person places web ring 1 onto the forward cargo hook. The aft hookup team (sling set 2) stands on top of the other end. The static wand person discharges the static electricity with the static discharge wand. The hookup person places web ring 2 onto the aft cargo hook. The hookup teams then carefully dismount the shelter and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



***Figure 2-68. 8- x 8- x 20-Foot Shelter Systems**

APPLICABILITY

The following 8- x 8- x 20-foot shelters are certified by the US Army NRDEC for CH-53E helicopters up to the airspeeds denoted below.

NOTE: Brief the pilot that these shelters tend to oscillate, particularly during turning maneuvers, and the recommended maximum airspeed applies to straight and level forward flight only. Lower the airspeed during turning maneuvers to reduce shelter oscillation.

LOAD DESCRIPTION

- AN/TGC-37, communications central:
 - TAMCN: A0268, NSN 5895-00-298-7374.
 - Weight: 16,733 pounds.
 - Airspeed: 80 knots.
- General purpose rigid shelter, 8- x 8- x 20-foot:
 - TAMCN: C6122, NSN 5411-01-209-3451.
 - Weight: 15,000 pounds (loaded).
 - Airspeed: 75 knots.
- Shelter, 8- x 8- x 20-foot, EMI:
 - TAMCN: C6112, NSN 5411-01-206-6078.
 - Weight: 15,000 pounds (loaded).
 - Airspeed: 70 knots.
- AN/TSM-170, maintenance repair group shelter:
 - Weight: 10,900 pounds (loaded).
 - Airspeed: 90 knots.
- AN/TYQ-23, tactical air operations module (TAOM):
 - TAMCN: A2525, NSN 5892-01-127-8134.
 - Weight: 17,000 pounds (loaded).
 - Airspeed: 100 knots.

- AN/TSQ-107, radar surveillance center:
 - TAMCN: Q0900
 - Weight: 9,950 pounds (loaded).
 - Airspeed: 70 knots.
- AN/TSQ-131, control and communications shelter:
 - Component of TAMCN: Q2110.
 - Weight: 14,050 pounds (loaded).
 - Airspeed: 80 knots.

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each).
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

NOTE: For load and sling set applicability, see chart below.

PERSONNEL

Two persons can prepare and rig each load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Secure all loose equipment inside the shelter with tape or nylon cord.
- Close and secure all hatches and vents. Secure any external hoses, cables, ladders, and power unit components with tape or nylon cord.
- Secure access doors in the closed/locked position.

If the shelter is equipped with rings as lifting provisions, make sure that the rings remain upright to prevent over stressing the load pin. Place the four rings in their upright position. Using nylon cord or suitable substitute, tie the ring on corner 1 to the ring on corner 4. Tie the rings on the other opposite corners (2 and 3) together.

Step 2. Rigging

NOTE: The single personnel door is designated as either the forward end or the aft end for rigging purposes and varies depending upon shelter contents. The corner lifting provisions

(shown in the figure) and the door position are identified in the chart.

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

- **Forward sling set (2 sling legs):**

- Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the shelter end that is identified as the forward end in the chart.
- Loop the chain end of the left and right sling legs through their respective lift provision located on the corners of the shelter and insert the link identified in the chart into the grabhook.

NOTE: If the shelter has ISO lifting provisions, route the chain through the opening in the side of the provision and out through the front opening.

- **Aft sling set (2 sling legs):**

- Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting on top of the other end of the shelter.
- Loop the chain end of the left and right sling legs through their respective lift provision located on the corners of the shelter and insert the link identified in the chart into the grabhook.

NOTE: If the shelter has ISO lifting provisions, route the chain through the opening in the side of the provision and out through the rear opening.

- **Secure excess chain with tape or nylon cord.**

- **Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the shelter to prevent entanglement during hookup and lift-off.**

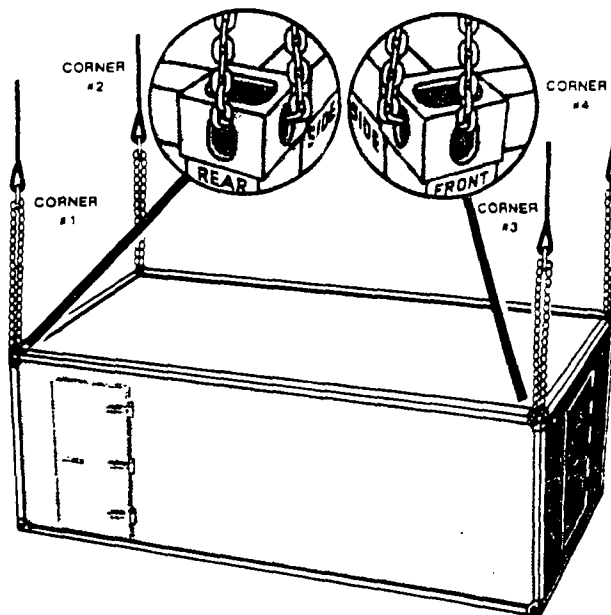
SHELTER	SINGLE PERSONNEL DOOR	TYPE SLING SET (POUNDS)	CORNER LIFTING PROVISIONS			
			1	2	3	4
AN/TGC-37	Aft	40,000	30	30	30	30
General Purpose Rigid	Forward	40,000	10	10	5	5
8- x 8- x 20 EM	Forward	40,000	10	10	5	5
AN/TYQ-23	Forward	40,000	16	16	3	3
AN/TSQ-107	Forward	15,000	31	31	3	3
AN/TSQ-107	Forward	40,000	21	21	3	3
AN/TSQ-131	Forward	40,000	21	21	3	3

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the forward designated end of the shelter. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the other end of the shelter. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the shelter and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



RADAR AND SATELLITE EQUIPMENT

The certified dual-point rigging procedures for radar and satellite equipment are in this section. Figure 2-69 gives detailed instructions for rigging the load. The figure also contains a description of the load and the materials required for rigging it.

Figure 2-69. OE-361/G Quick Reaction Satellite Antenna

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 110 knots.

LOAD DESCRIPTION

- OE-361/G quick reaction satellite antenna (QRSA), NSN 5895-01-179-5494.
- Weight: 4,830 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Felt padding or other suitable cushioning material.

PERSONNEL

Four persons can prepare and rig the load in 30 minutes.

PROCEDURES

Step 1. Preparation

- Install the spreader bar assembly that is stored on the load. After hooking the spreader bar assembly cables to the lift rings, tape the keepers securely with 2-inch tape.
- Pad both spreader bars with felt or other cushioning material to prevent damage to the antenna panels during load release. Tape or tie the padding securely to prevent it from being dislodged during flight.
- Pad the uppermost stacked antenna panel with available material to prevent possible damage from the apex clevis during load release. Tape or tie the padding securely to prevent it from being dislodged during flight.

- Ensure that the ladder, box covers, and any other loose items are properly secured. If the tie-down straps are missing or worn, replace with nylon cord.

Step 2. Rigging

NOTE: Forward end of the load is the end to which the ladder is attached.

- Forward sling set (two sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the ladder end of the load.
 - Loop the chain end of the left and right sling legs through the respective lift eyes on the ends of the spreader bar and insert link 3 in the grabhook.
- Aft sling set (two sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the other end of the load.
 - Loop the chain end of the left and right sling legs through the respective lift eyes on the ends of the spreader bar and insert link 30 in the grabhook.
- Wrap padding around each grabhook to prevent possible damage from the grabhook during load release. Tape or tie the padding securely to prevent it from being dislodged during flight.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together to prevent entanglement during hookup.

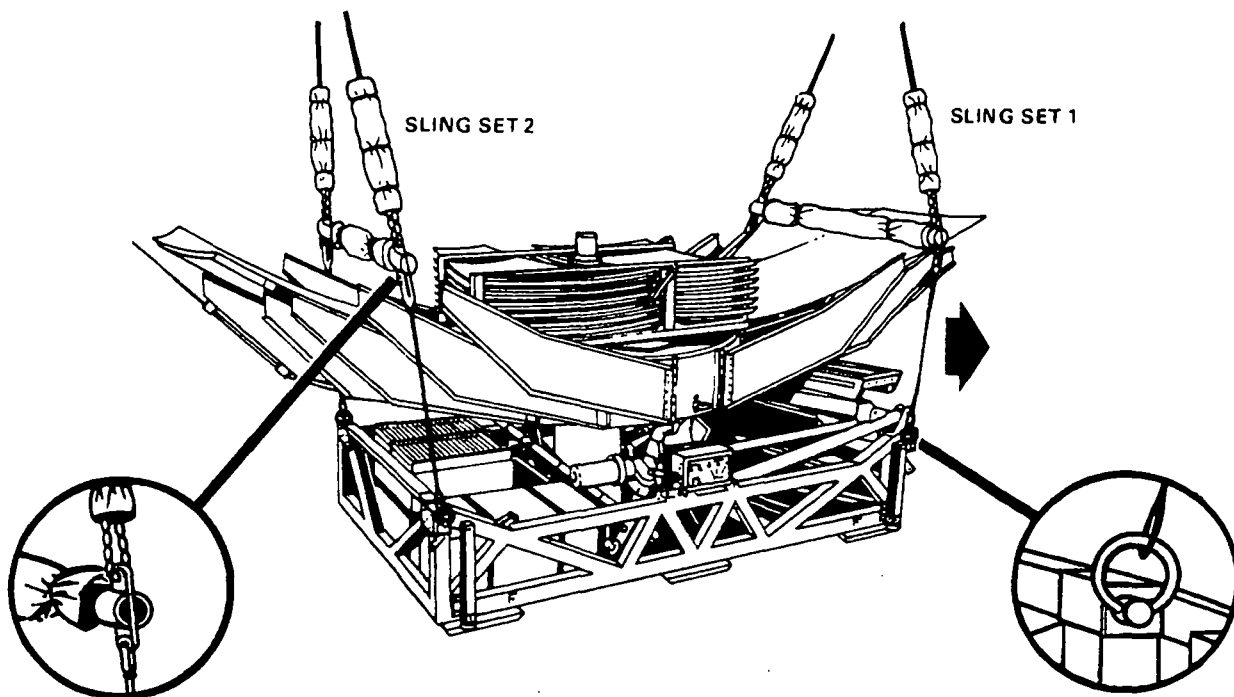
Step 3. Hookup

The hookup team stands on top of the load between the stacked antenna panels and on either side of the center post. The static wand person discharges the static electricity with the static wand. The forward hookup person (ladder end of load) places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team should dismount on opposite sides of the load and observe sling legs as the helicopter removes slack in the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

CAUTION: Brief the helicopter crew to relax sling leg tension and to hover to the side of the load when releasing the apex fitting. Damage may occur to the antenna if this caution is not observed.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



GENERATOR SETS

The certified dual-point rigging procedures for generator sets are in this section. Figures 2-70 through 2-73 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-70. PU-751/M and PU-753/M Generator Sets

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 75 knots.

LOAD DESCRIPTION

- PU-751/M generator set, 5 kw, LIN G37273:

VARIANTS	CURB WEIGHT (pounds)	MAXIMUM EAT WEIGHT (pounds)
LOS (V1) Trailer	2,772	3,000
LOS (V3) Trailer	2,772	3,000
LOS (V4) Trailer	2,772	3,000
LOS (V2) Trailer	2,772	3,000
Planning Trailer	2,531	3,000
Radio Access Unit Trailer	2,751	3,000

- PU-753/M generator set, 10 kw, LIN G40744:

VARIANTS	CURB WEIGHT (pounds)	MAXIMUM EAT WEIGHT (pounds)
NC OPS Trailer	2,681	3,000
SCC Tech Trailer	2,681	3,000
NC MGMT Trailer)	2,681	3,000
LEN MGMT Trailer)	2,681	3,000
LEN OPS Trailer	2,759	3,000
SEN (V1) Trailer	2,759	3,000
SEN (V2) Trailer	2,759	3,000
Maintenance 1 Trailer	2,680	3,000

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.

- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

One person can prepare and rig the load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Partially retract all landing legs. Secure in position and tie with nylon cord.
- Retract lunette leg. Secure in position and tie with nylon cord.
- Engage both hand brakes.
- Tie off safety chains and brake hose with tape or nylon cord.
- Secure all lids, doors, and caps with tape or nylon cord.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position apex fitting on trailer lunette.
 - Loop the chain end of the left and right sling legs through their respective lift provisions on the forward end of the trailer and insert link 3 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting behind the generator.
 - Loop the chain end of left and right sling legs through their respective lift provisions on the aft end of the trailer and insert link 40 in the grabhook. Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the two forward sling legs on the top front of the generator set. Tape the sling legs to the front bow to prevent entanglement with the cable reel handle.
- Cluster and tie or tape (breakaway technique) the two rear sling legs on the top rear of the generator set.

Step 3. Hookup

The hookup team stands on the trailer fenders. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 on the aft cargo hook. Do not use the center cargo hook. The hookup team dismounts and remains close to the load as the helicopter removes slack in the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

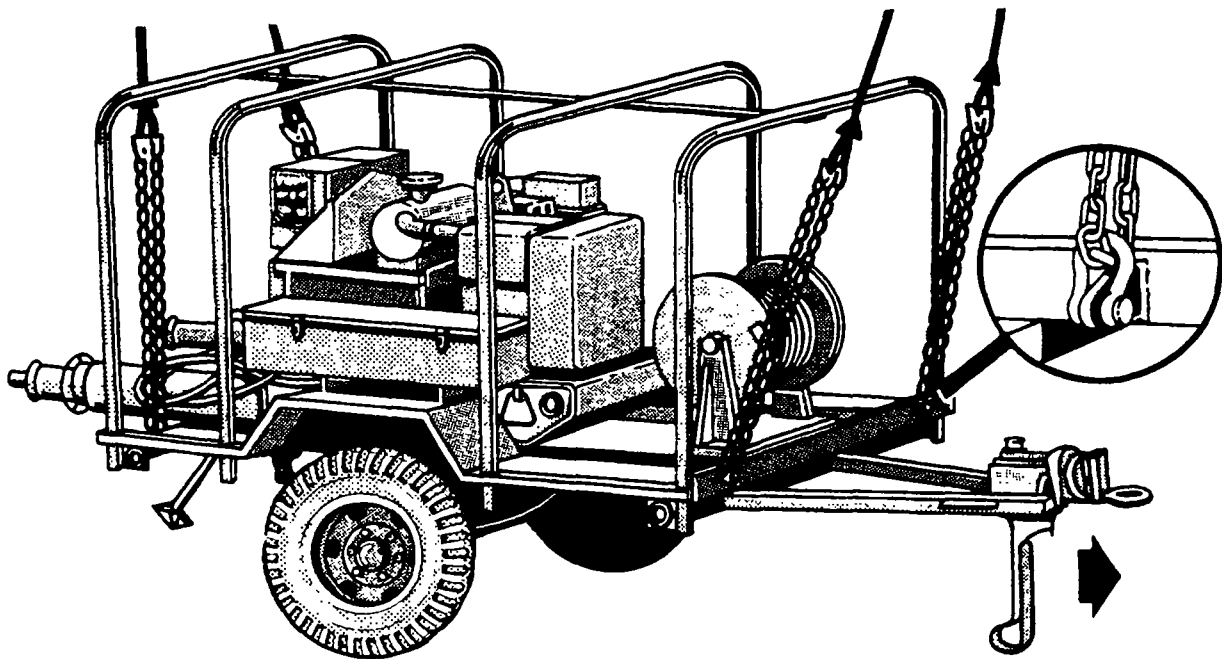


Figure 2-71. M353 Trailer Chassis with Generator Sets

APPLICABILITY

The following generator sets identified below are certified by the US Army NRDEC for CH-53A/D/E helicopters at airspeeds up to and including 120 knots.

LOAD DESCRIPTION

- Chassis, trailer, M353, 3 1/2-ton:
 - TAMCN D0080, NSN 2330-00-542-2831 or LIN E02670.
 - Weight: 2,720 pounds.
- Generator sets mounted on M353 trailer chassis:

GENERATOR SETS	LIN	TAMCN	NSN	WEIGHT (pounds)
MEP-005A	J36109	B0953	6115-00-118-1240	6,220
MEP-006A	J38301	B1021	6115-00-118-1243	7,720
MEP-114A	J36725	B0971	6115-00-118-1248	6,220
MEP-115A	J38506	B1016	6115-00-118-1253	6,320

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each), or
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Engage both hand brakes.
- Secure safety chains and brake hoses with tape or nylon cord.
- Secure all lids, doors, and caps with tape or nylon cord.

Step 2. Rigging

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outerload-carrying sling legs.

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1. Position apex fitting/web ring on top of the front end of the trailer.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the front end of the trailer and insert link 10 in the grab link.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position apex fitting/web ring on top of the aft end of the trailer.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the rear end of the trailer and insert link 15 in the grab link.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the generator to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The forward hookup team (apex fitting 1) stands on top of the forward edge of the trailer. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands behind the generator. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the generator and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

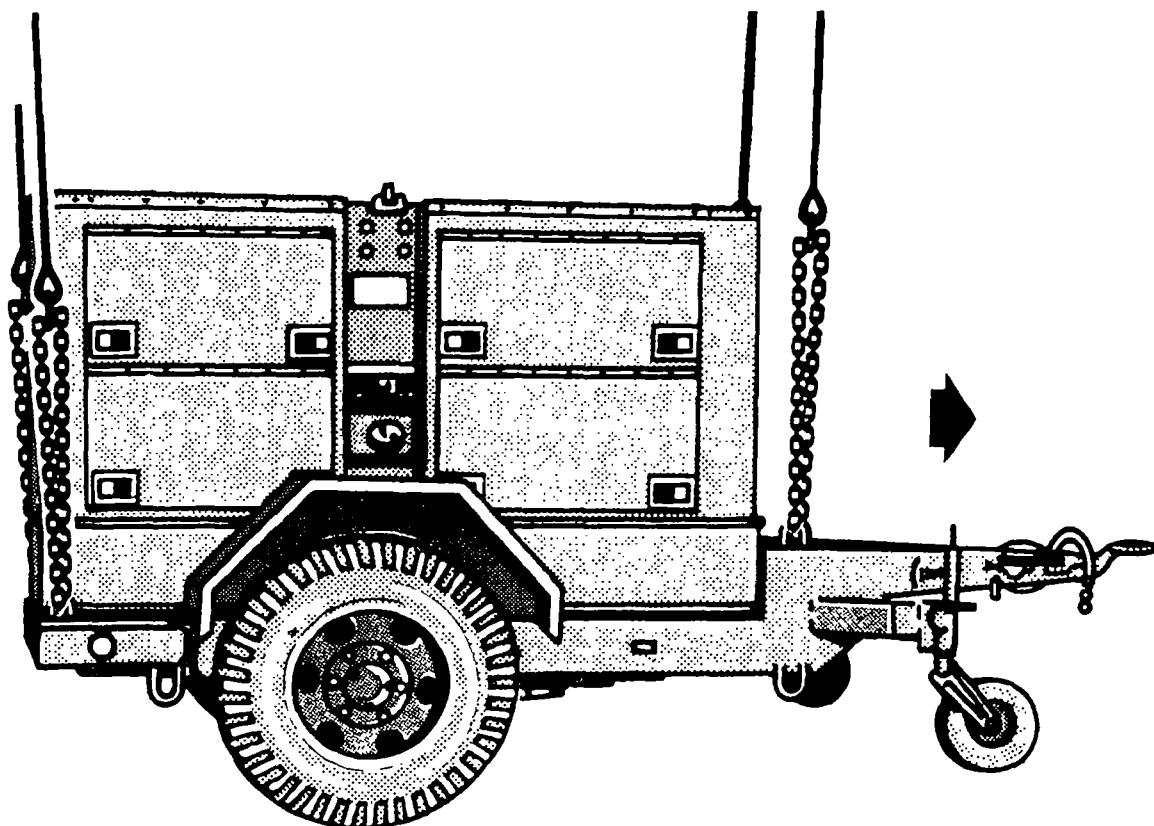


Figure 2-72. Aviation Ground Power Unit (AGPU)

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 100 knots.

LOAD DESCRIPTION

- Aviation ground power unit (AGPU), LIN P44627.
- Load weight: 4,190 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tie-down assembly, CGU-1/B (4 each).
- Cord, nylon, Type III, 550-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll,
- Nylon, tubular, 1/2-inch, 1,000-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Stow and secure the tow bar with 1/2-inch tubular nylon.
- Close all doors, secure handles with tape, and attach four tie-down straps.
- Route one tie-down strap horizontally around the power unit. Position strap approximately 16 inches down from the top of the power unit. Repeat this procedure with another tie-down strap positioned approximately 8 inches higher than the first strap.
- Route another tie-down strap through the forklift provisions and then vertically around the power unit. Repeat this procedure using another tie-down strap through the other forklift provision.
- Secure all equipment inside the unit with nylon cord.
- Secure closed exhaust cover with tape.

CAUTION: Particular attention should be given to securing the exhaust cover to preclude possible damage during flight. If cover cannot be adequately secured, then it should be removed.

- Ensure that fuel tank is not more than 3/4 full. Inspect fuel tank cap, oil filler caps, and battery caps to ensure they are installed properly and are secure.
- Engage the parking brake.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the tongue end of the unit.
 - Loop the chain end of the left and right sling legs through their respective lift provisions and insert link 3 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the other end of the power unit.
 - Loop the chain end of the left and right sling legs through their respective lift provisions and insert link 3 in the grabhook.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The hookup team stands on top of the unit. The static wand person discharges the static electricity with the static wand. One hookup person places apex fitting 1 onto the forward cargo hook. The other hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the power unit and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

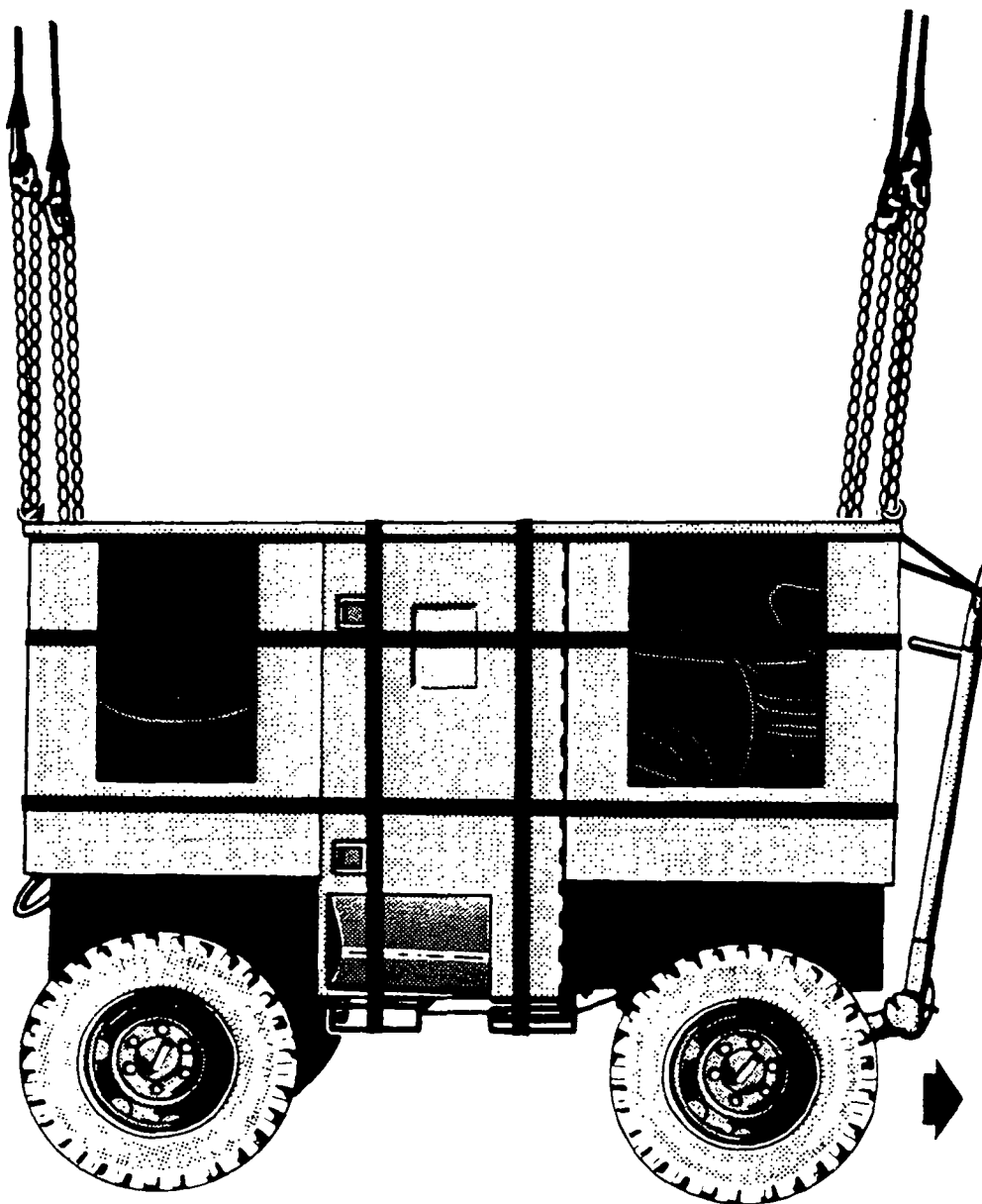


Figure 2-73. M200A1 Trailer-Mounted Generator Sets

APPLICABILITY

The following generator sets are certified by the US Army NRDEC for the identified helicopter up to the airspeeds denoted below.

LOAD DESCRIPTION

- PU-405A/M power unit, 15 kw, with acoustic suppression kit (ASK):
 - LIN J35492.
 - Weight: 6,740 pounds.
 - Type helicopter: CH-47.
 - Airspeed: 80 knots.
- PU-406B/M power unit, 30 kw, with acoustic suppression kit (ASK):
 - Weight: 7,250 pounds.
 - Type helicopter: CH-47.
 - Airspeed: 80 knots.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Padding, felt or cellulose.

PERSONNEL

One man can prepare and rig the load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Lower the lunette as far as possible by adjusting the landing leg.
- Engage both hand brakes.
- Secure safety chains and brake hose with tape or nylon cord.
- Secure all lids, doors, and caps with tape or nylon cord.

Step 2. Rigging

- Sling set 1 (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the tongue end of the unit.
 - Loop the chain end of the left and right sling legs through their respective lift provisions and insert the link identified below in the grabhook.
- Sling set 2 (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the other end of the power unit.
 - Loop the chain end of the left and right sling legs through their respective lift provisions and insert the link identified below in the grabhook.

GENERATOR	SLING SET 1	SLING SET 2
PU-405A/M with ASK	3	9
PU-406B/M with ASK	3	9

- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together to prevent entanglement during hookup and lift-off.

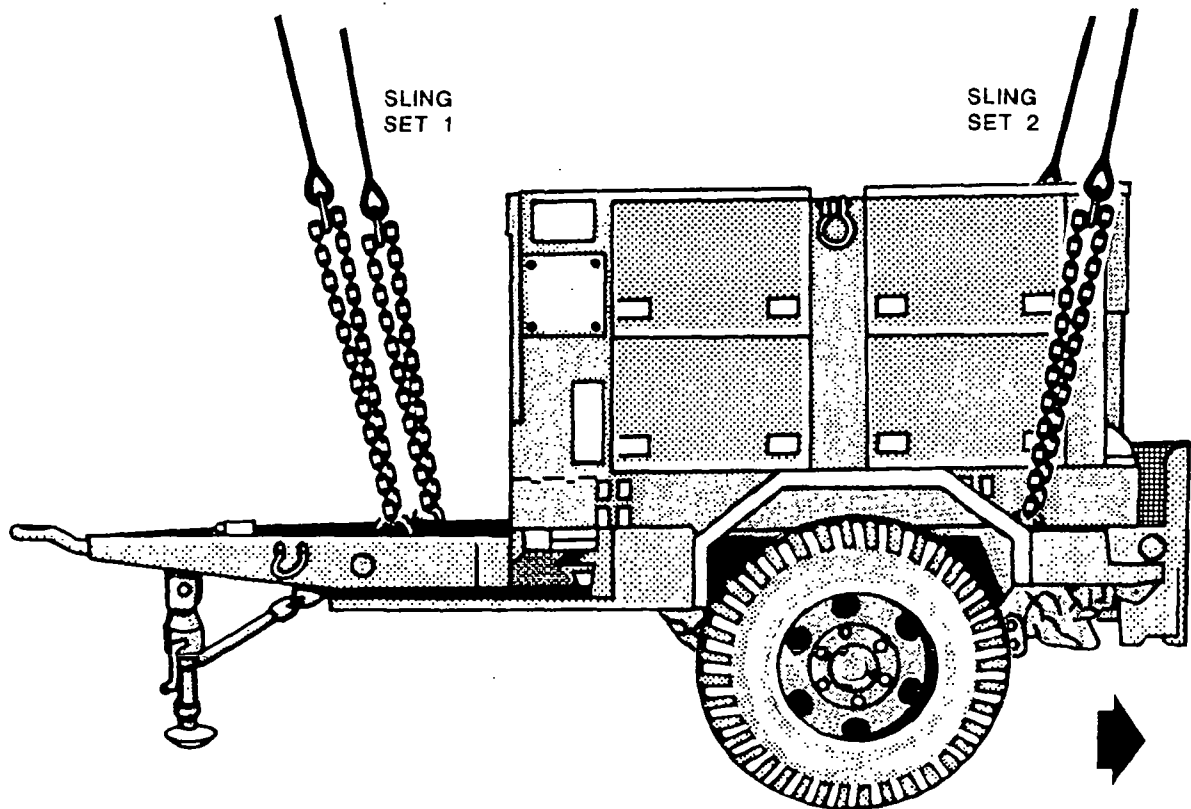
Step 3. Hookup

NOTE: Connect the apex fittings to the helicopter cargo hooks so the trailer lunette is carried aft (opposite the direction of flight).

The hookup team stands on top of the unit or on the trailer fenders. The static wand person discharges the static electricity with the static wand. One hookup person places apex fitting 1 onto the aft cargo hook. The other hookup person places apex fitting 2 onto the forward cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the power unit and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



MISCELLANEOUS EQUIPMENT

The certified dual-point rigging procedures for miscellaneous equipment are in this section. Figures 2-74 and 2-75 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-74. Downsized Direct Support Section (DDSS) M101A2 Trailer

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 100 knots.

LOAD DESCRIPTION

- Downsized direct support section (DDSS) trailer, M101A2.
- Weight: 2,700 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (5,000-pound capacity), as required.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Make sure the front and side racks are in place and secure.
- Fasten the tailgate in the open position with the chains on each side hooked through the keeper. If the tailgate does not have chains attached, fasten the tailgate in the open position using the tie-down straps.
- Secure all cargo in the bed of the trailer using tie-down straps, tape, or nylon cord.
- Using tape or nylon cord, secure the light cable and safety chains to the top of the trailer tongue.
- Engage parking brake.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 1. Position the apex fitting on top of the trailer tongue.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the front of the trailer chassis and insert link 3 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to apex fitting number 2. Position the sling set on the ground behind the trailer.
 - Route the chain end of the left sling leg down through the opening between the tailgate and the trailer bed directly above the lift provision, through the left lift provision, and back up through the opening. Insert link 21 in the grabhook. Repeat with the right sling leg on the right lift provision. Secure excess chain with tape or nylon cord.
- Lift the rear sling legs and tape or tie the grabhook or sling leg (breakaway technique) to their respective trailer side rack so the chain will not become slack and bind in the opening between the tailgate and trailer bed.
- Cluster and tie or tape (breakaway technique) all sling legs in each sling set on top of the trailer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the apex fittings so the trailer lunette is carried forward.

The hookup team stands on top of the trailer. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook and the aft hookup person places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the unit and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

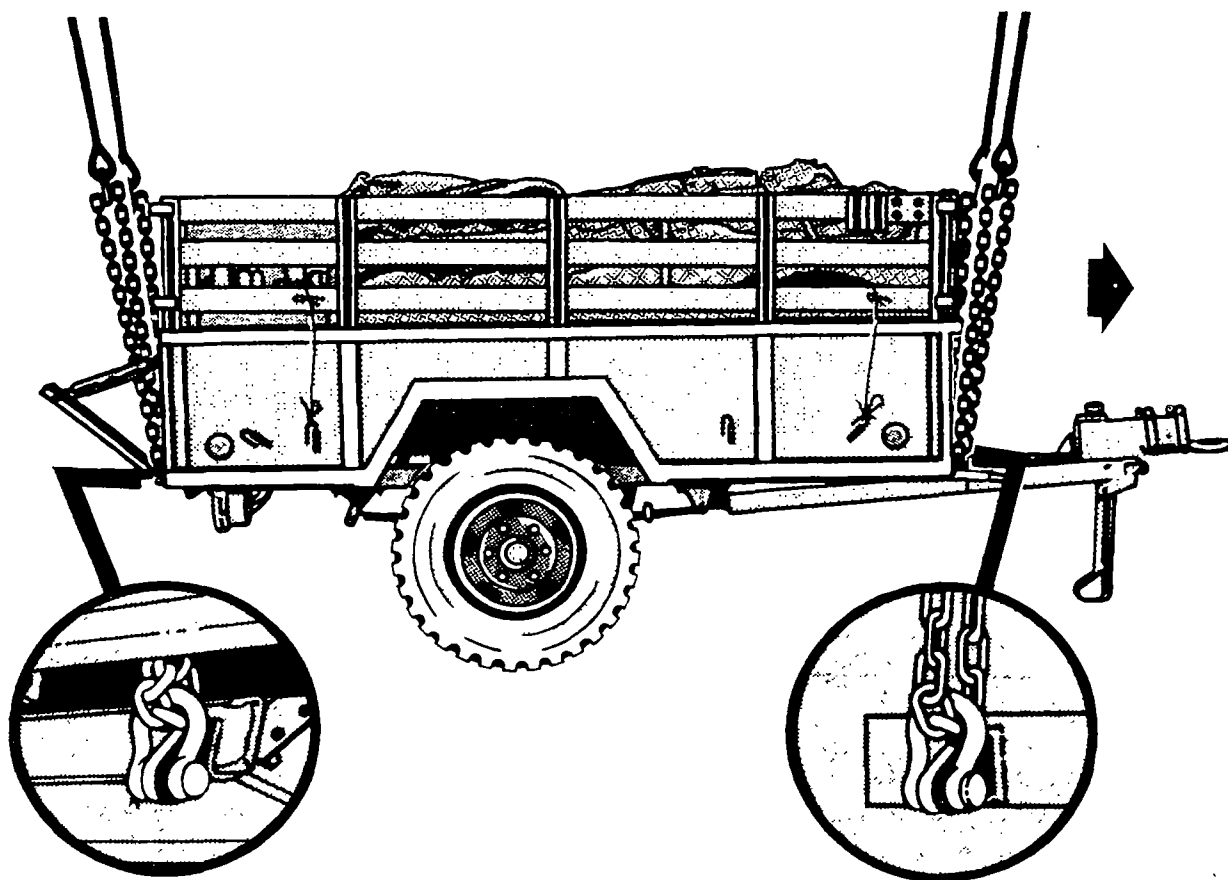


Figure 2-75. Downsized Direct Support Section (DDSS) Shelter

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 70 knots.

CAUTION: Transporting this shelter at airspeeds in excess of 70 knots may result in sudden and uncontrollable instabilities.

LOAD DESCRIPTION

- Downsized Direct Support Section (DDSS) shelter, part no. 707500-010, manufactured by Brunswick Corporation.
- Weight: 2,400 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Secure all loose equipment inside the shelter with tape or nylon cord as required.
- Close and secure all doors and vents with tape or nylon cord.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the ECU end of the shelter.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the shelter corners and insert link 10 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on top of the other end of the shelter.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located on the shelter corners and insert link 20 in the grabhook.

- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set together to prevent entanglement during hookup and lift-off.

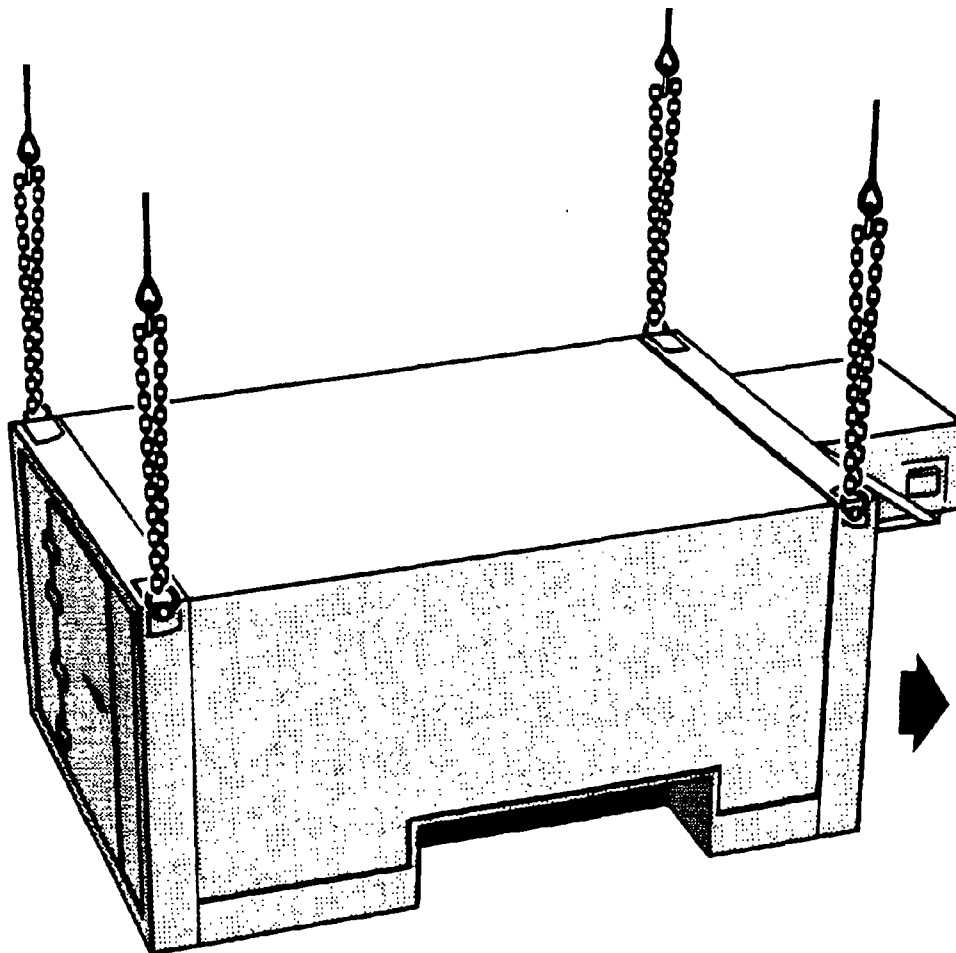
Step 3. Hookup

NOTE: Connect the apex fittings so the shelter is carried ECU end forward.

The hookup team stands on top of the shelter. The static wand person discharges the static electricity with the static wand. One hookup person (ECU end) places apex fitting 1 onto the forward cargo hook. The other hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the shelter and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



CHAPTER 3

SUITABLE DUAL-POINT LOAD RIGGING PROCEDURES

This chapter contains rigging procedures for loads that have not been certified but have been evaluated and demonstrated acceptable flight characteristics during a flight test. In most cases, the lifting provisions have not been tested according to MIL-STD-209G. These loads are identified by the word "suitable" in the applicability paragraph. When the rigging procedures for these loads are certified, they will be moved to the certified chapter as the manual is updated. Each rigging procedure is found in a figure that includes a description of the load, materials required for rigging, and steps to complete the procedure.

WHEELED VEHICLES

The noncertified dual-point rigging procedures for wheeled vehicles are in this section. Figures 3-1 through 3-2 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 3-1. M561 Cargo Truck

APPLICABILITY

This load is suitable for CH-47D helicopters at airspeeds up to and including 80 knots.

LOAD DESCRIPTION

- Truck, cargo, 1 1/4-ton, M561, with truss kit installed, LIN X39940.
- Weight: 7,340 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Remove canvas covers from the cargo compartment and the cab. Remove windshield and bows. Secure all loose equipment inside the cargo compartment.
- Secure engine hood in place. Check batteries and seats for security.
- Install truck truss kit.

Step 2. Rigging

CAUTION: Do not use these procedures if you cannot install the truss kit.

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the cab.
 - Loop the chain end of the left and right sling legs through their respective lift rings on the front corners of the cab and insert link 5 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting number 2. Position the apex fitting on top of the cargo bed.
 - Loop the chain end of the left and right sling legs through their respective lift provision on the rear corners of the cargo bed and insert link 5 in the grabhook.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set on top of each end to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the driver's seat and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands in the cargo bed and places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the truck and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

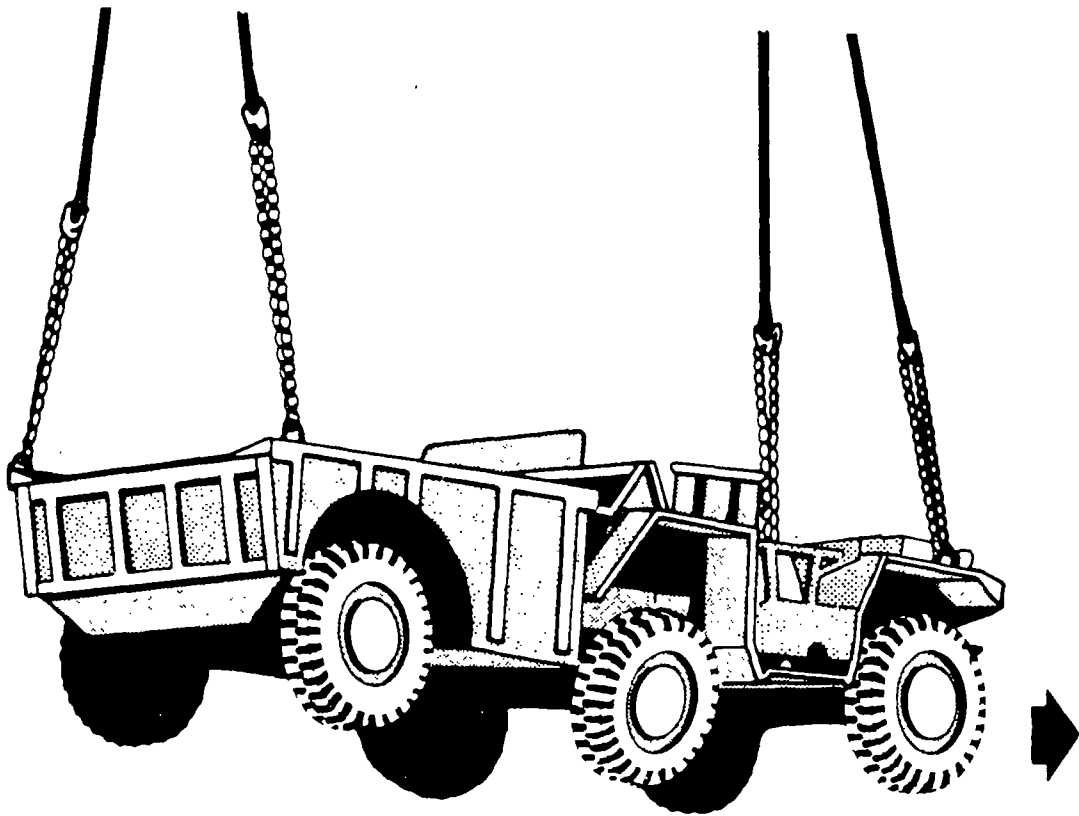


Figure 3-2. M35A1/2 2 1/2-Ton Cargo Truck

NOT CURRENTLY APPROVED FOR LIFT WITH ORIGINAL FRONT LIFT PROVISIONS

APPLICABILITY

This load is suitable for CH-47D helicopters at airspeeds up to and including 90 knots.

LOAD DESCRIPTION

- Truck, cargo, 2 1/2-ton, M35A1/2, LIN X40146.
- Weight: 13,180 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B, as required.

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Remove the cargo compartment canvas and bows. Secure in truck bed.
- Remove cab top canvas, lower the windshield, fold the canvas over the windshield, and secure with nylon cord.
- Secure windshield in the down position with the tie-down straps.
- Safety-tie hood closed with nylon cord around the hood latch brackets and front grill.
- Make sure fuel cap is secure; oil filler, radiator, and battery caps are properly installed; and the battery compartment door is fastened.
- Tie down seats and secure doors with nylon cord.
- Engage vehicle hand brake and place transmission in neutral.
- Straighten front wheels and secure steering wheel in place with nylon cord.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the hood.
 - Loop the chain end of the left and right sling legs through their respective lift provision mounted on the front bumper and insert link 35 in the grabhook. Secure excess chain with tape or nylon cord.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting number 2. Position the apex fitting on top of the cargo bed.
 - Loop the chain end of the left and right sling legs through their respective lift provision on top of the spring housing between the rear wheels. Insert link 3 in the grabhook.
 - Pull each grabhook up against the side of the truck and tie the chain in the chain guide bracket so that it will not fall out of the guide. Pull both grabhooks together over top of the bed and tie together with tape or cotton webbing so the chain and grabhook will not become entangled on the truck bed sides.

NOTE: Make sure the hook on the grabhook faces away from the truck bed to prevent the hook from being caught on the truck bed.

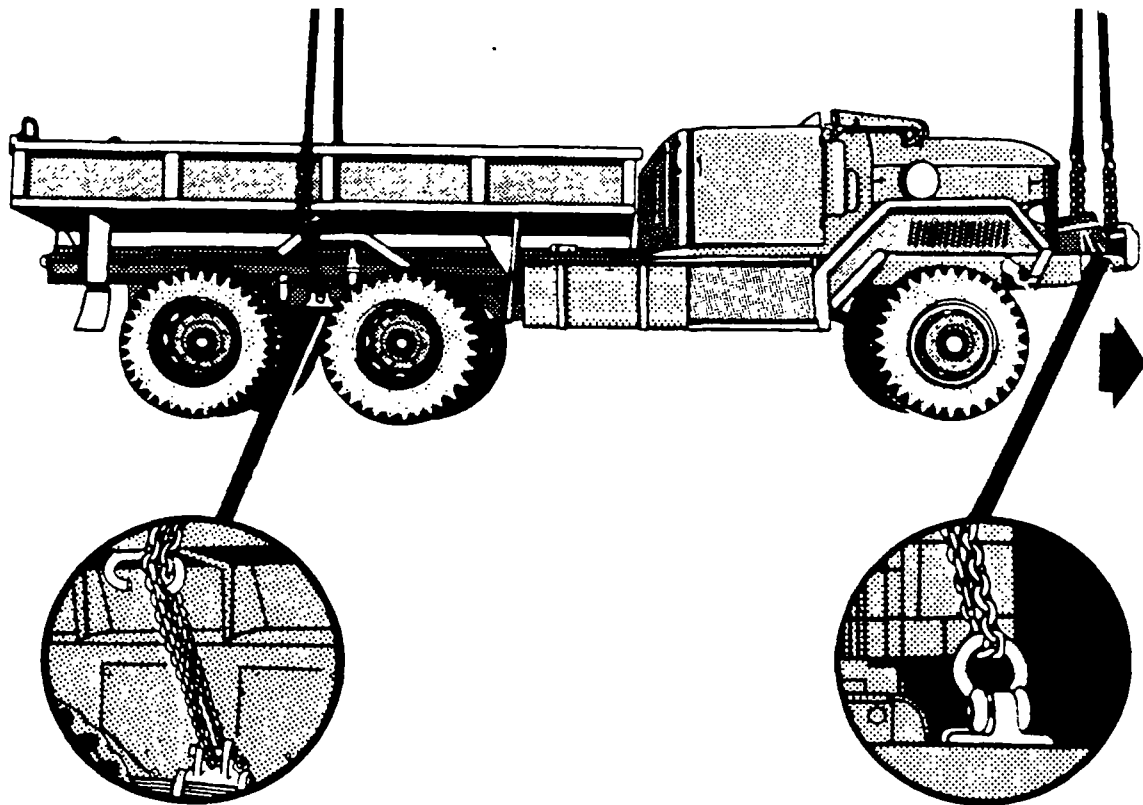
- Cluster and tie or tape (breakaway technique) sling legs in each sling set on top of the truck to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the passenger's seat and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands in the cargo compartment and places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the truck and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



TRAILERS

The suitable dual-point rigging procedures for trailers are in this section. Figure 3-3 gives detailed instructions for rigging loads. It also contains a description of the load and the materials required for rigging it.

Figure 3-3. M149-Series Water Trailer

APPLICABILITY

This load is suitable for CH-47D helicopters at airspeeds up to and including 60 knots.

LOAD DESCRIPTION

- Trailer, water, 400-gallon, M149-series, with original lift provisions, LIN W98825.
- Weight:

	EMPTY (pounds)	LOADED (pounds)
M149	2,540	6,060 (see Warning)
M149A1	2,540	6,060 (see Warning)
M149A1	2,800	6,320 (see Warning)

WARNING

M149, M149A1, and M149A2 water trailers, without modified clevis-type lift provisions, are not currently certified for EAT because of inadequate lift provision strength when the trailer is loaded.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Secure the light cable and air hoses to the drawbar with tape or nylon cord.
- Place the support leg and wheel in the DOWN position.
- Tape the top edge of the aft end of the water tank to prevent the sling legs from chafing on the top of the tank.
- Engage both hand brakes.
- Make sure that the fill port is securely closed. Tape if necessary.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on the ground in front of the lunette.
 - Loop the chain end of the left and right sling legs through the lunette and insert link 3 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting number 2. Position the apex fitting on top of the water tank.
 - Using the rear lift provisions as a guide to keep the chains in place, route the chain end of the left sling leg down between the tank and the crossmember, under the rear crossmember, and back up through the lift provision. Insert link 3 in the grabhook. Repeat with the right sling leg and the right rear lift provision.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set on top of the trailer to prevent entanglement during hookup and lift-off.

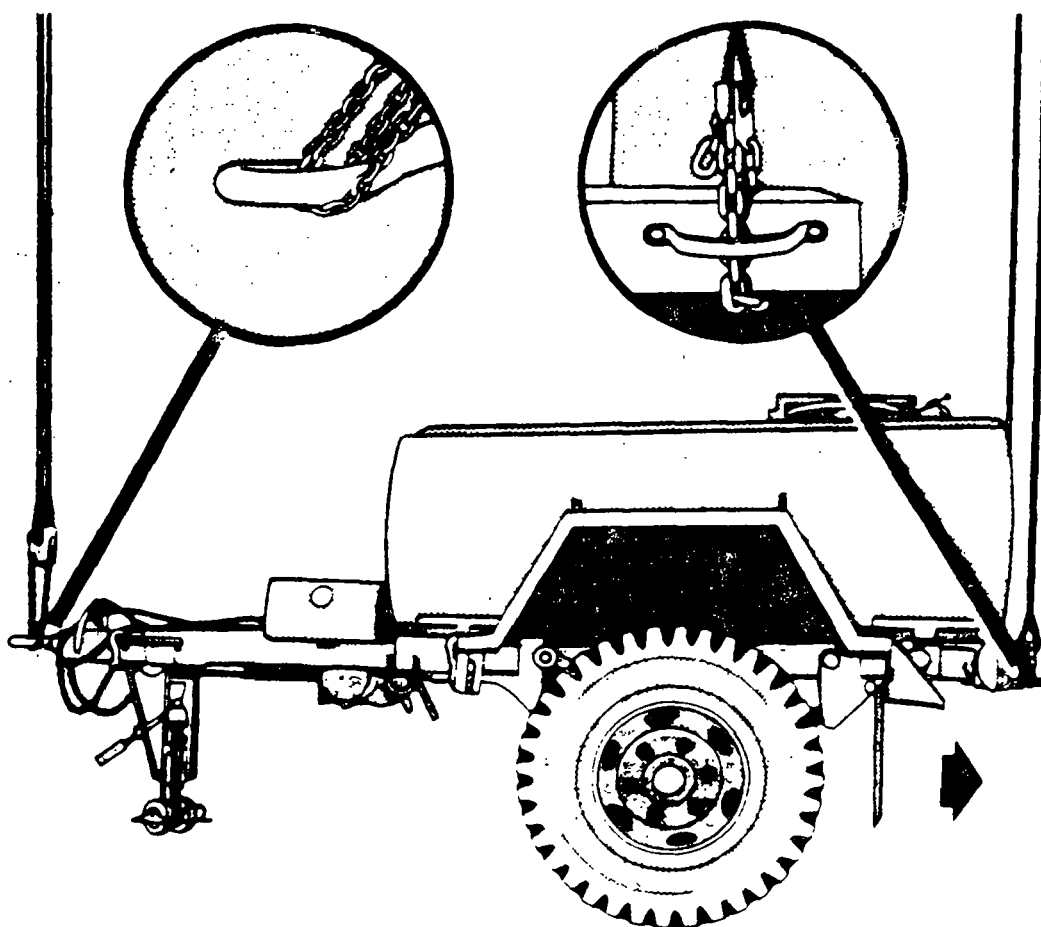
Step 3. Hookup

NOTE: The water trailer is carried tongue aft.

The static wand person discharges the static electricity with the static wand. One hookup person stands on the trailer fender and places apex fitting 2 onto the forward cargo hook. The other hookup person stands on the tongue and places apex fitting 1 onto the aft cargo hook. The hookup team then carefully dismounts the trailer and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



HOWITZERS

*The suitable dual-point rigging procedures for howitzers are in this section. Figures 3-4 and 3-5 give detailed instructions for rigging loads. The figures also contains a description of the load and the materials required for rigging it.

Figure 3-4. M114A1 155-mm Howitzer

APPLICABILITY

This load is suitable for CH-47D helicopters at airspeeds up to and including 90 knots.

LOAD DESCRIPTION

- Howitzer, towed, 155-mm, M114A1, LIN K57803.
- Weight: 12,660 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B, as required.
- Clevis assembly, large, MS 70087-3 (1 each).

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

Step 1. Preparation

- Stow all howitzer equipment, including sights, in the proper place except the spade key. Stow spade key in section chest. Secure all equipment with tape or nylon cord.
- Secure the section chest on the rear of the trails by routing the tie-down strap through the handles of the chest and both trail lifting handles. Secure excess strap.
- Secure spades to brackets with nylon cord. Secure all cables and hoses to sides of trails with tape or nylon cord.
- Secure trail latching handle in the closed position with nylon cord and insert trail locking pin.

- Engage only one hand brake so the howitzer will not rotate over on the muzzle on touchdown.
- Position the left ballistic shield in the raised position.
- Remove or secure all gun covers.

Step 2. Rigging

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the barrel. Route the left sling leg to the left side of the barrel and the right sling leg to the right side.
 - Loop the chain end of the left sling leg through the firing jack locking pin receiver and insert link 55 in the grabhook. Repeat with the right sling leg. Make sure the grabhooks are on their respective sides of the barrel. Secure excess chain with tape or nylon cord.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting number 2. Position the apex fitting on top of the breech. Position the large clevis on the ground between the trails.
 - Route the chain end of the left sling leg through the large clevis, down through the center of the trails, under the left trail, and up through spade key bracket on the outside of the left trail. Insert link 3 in the grabhook.
 - Route the chain end of the other sling leg through the large clevis, down through the center of the trails, under the right trail, and up through the aft spade key bracket on the outside of the right trail. Insert link 3 in the grabhook.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set on top of the howitzer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the wheels and places apex fitting 1 onto the forward cargo hook. The aft hookup person stands on the trails and places apex fitting 2 onto the aft cargo hook. The hookup team then carefully dismounts the howitzer and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

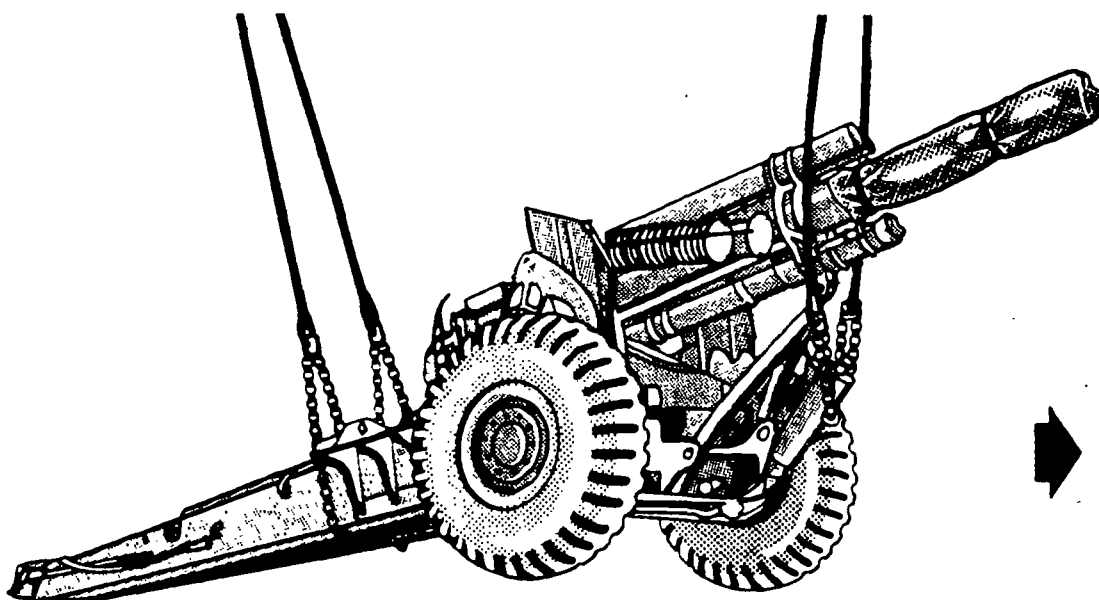


Figure 3-5. M198 155-mm Howitzer, Towed

APPLICABILITY

This load is suitable for CH-47 helicopter up to and including 130 knots, when rigged with or without the pendant adapter assembly.

LOAD DESCRIPTION

- Howitzer, medium, towed, M198, 155-mm, LIN K57821 NSN 1025-01-026-6648.
- Weight: 15,740 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with additional apex fitting (25,000-pound capacity) and two additional chains, 8-foot length (6,250-pound capacity), and coupling links.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Padding, felt or suitable substitute.
- Tie-down strap, cargo, CGU-1/B, as required.
- Clevis assembly, large (part no. MS 70087-3) (1 per lift provision).
- Pendant adapter assembly, part no. 1670EG093-1, NSN 1670-00-574-8049, component of aerial recovery kit (2 each).

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Using the tie-down straps, secure the spades to the trails.
- Secure air hoses and electrical cable to the outboard side of the right trail.
- Stow all equipment in place and secure with tape or nylon cord.
- Pad the sight mounts and secure with tape or nylon cord.
- Attach a large clevis assembly to the trail and carriage lifting provisions.
- Ensure that the top carriage locking pin is in place and secured with a locking safety clip.

CAUTION: Do not attempt to lift the howitzer if the top carriage lock pin will not drop into place or if the locking safety clip is missing. Either of these conditions could result in the top carriage rotating in flight.

- Position the barrel and install the travel lock; secure with pins.

Step 2. Rigging

NOTE: When using the pendant assembly, connect the sling set apex fitting to the pendant lower loop. When hooking up the load to the helicopter, connect the upper loop to the cargo hook.

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the forward end of the breech.
 - Loop the chain end of the left and right sling legs through the clevis assemblies on the carriage lift provisions and insert link 3 in the grabhook.
 - Tape or tie (breakaway techniques) the two sling legs together every foot to prevent the sling legs from becoming entangled on the howitzer.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Using the proper coupling link, attach the additional chain lengths to the two sling leg assemblies. Position the apex fitting on top of the baseplate between the trails.
 - Loop the chain end of the left and right sling legs through the clevis assembly on each trail lift provision and insert link 33 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set on top of the howitzer to prevent entanglement during hookup and lift-off.

Step 3. Hookup

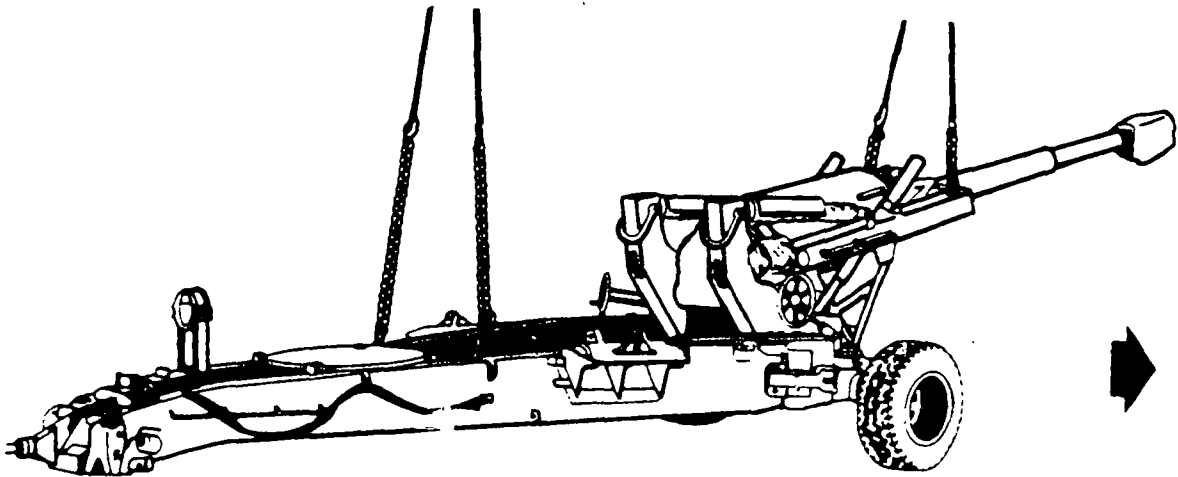
NOTE: The static wand person is not required when the optional pendant is used to connect the load to the cargo hook.
THE HELICOPTER MUST APPROACH THE HOWITZER OVER THE TRAILS.

- Forward hookup team (barrel end).
 - The hookup team stands on top of the gun carriage. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting onto the forward cargo hook.

- Aft hookup team (trail end).
 - The hookup team stands on the firing base plate. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting onto the aft cargo hook.
- The hookup teams then carefully dismount the howitzer and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



CONTAINERS

*The suitable dual-point rigging procedures for containers are in this section. Figures 3-6 through 3-7 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 3-6. One CONEX Container

APPLICABILITY

This load is suitable for CH-47D helicopters at airspeeds up to and including 60 knots.

LOAD DESCRIPTION

- Box, metal, shipping, 295-cubic feet (CONEX).
- Weight: 1,578 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (2 each).

PERSONNEL

Two persons can prepare and rig this load in 5 minutes.

PROCEDURES

Step 1. Preparation

- Close and secure doors with tie-down strap routed through the hinges and door handle. If hinges are not accessible, connect a second tie-down assembly to the first tie-down and route the strap around the container.

Step 2. Rigging

NOTE: Corners of the container are designated numerically according to the diagram to assist in rigging.

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the door end of the container.

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the door end of the container.
 - Loop chain end of one sling leg through the lift provision on top of corner 1. Place link 86 in grabhook.
 - Loop chain end of other sling leg through the lift provision on top of corner 2. Place link 3 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting number 2. Position the apex fitting on top of the container.
 - Route one sling leg to the outside of sling leg 2 and loop chain end through the lift provision on top of corner 3. Place link 51 in grabhook.
 - Route the other sling leg to the outside of sling leg 2 and loop chain end through the lift provision on top of corner 4. Place link 86 in the grabhook.
- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Connect the two apex fittings so that the container is carried with corner number 1 forward.

The hookup team stands on top of the container. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the container and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

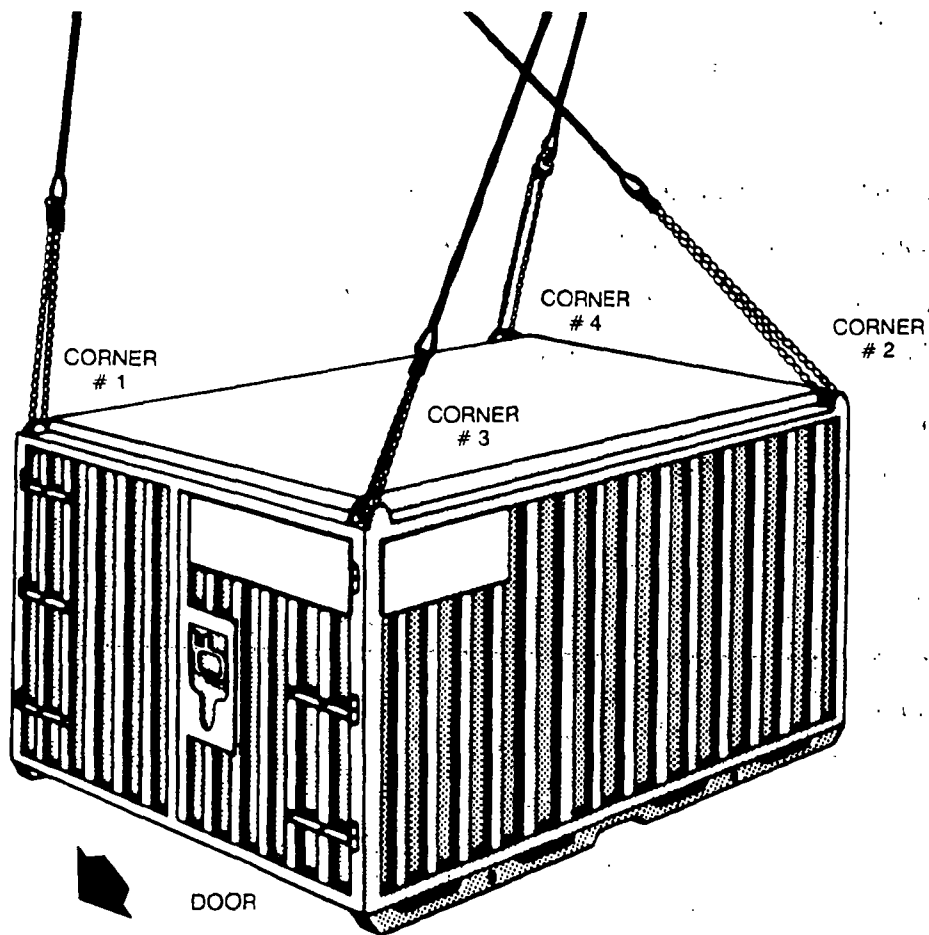


Figure 3-7. One MILVAN Container

APPLICABILITY

This load is suitable for CH-47D helicopters at airspeeds up to and including 60 knots.

LOAD DESCRIPTION

- Container, general cargo, MILVAN, LIN C13825.
- Weight: 4,710 pounds (empty).

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.

PERSONNEL

Two persons can prepare and rig the load in 10 minutes.

PROCEDURES

Step 1. Preparation

- Close and secure container door.

Step 2. Rigging

NOTE: Door end is designated as the forward end.

- Forward sling set 1 (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the container door end.
 - Loop the chain end of the left and right sling legs through the opening on the side of their respective corner lift provisions and out the front opening. Insert link 3 in the grabhook.
- Aft sling set 2 (2 sling legs):
 - Connect two sling legs to the additional apex fitting number 2. Position the apex fitting on top of the other end of the container.
 - Loop the chain end of the left and right sling legs through the opening on the side of their respective corner lift provisions and out the rear opening. Insert link 33 in the grabhook. Secure excess chain with tape or nylon cord.

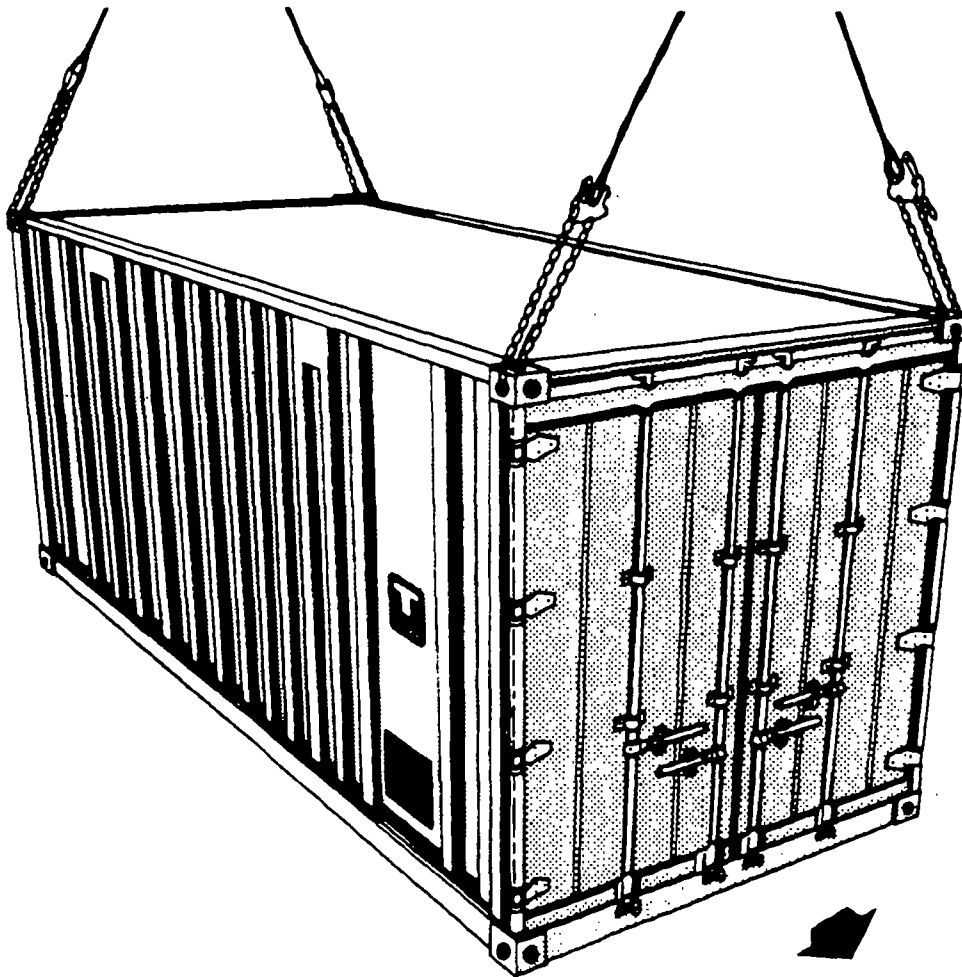
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set to prevent entanglement during hookup and lift-off.

Step 3. Hookup

The hookup team stands on top of the container. The static wand person discharges the static electricity with the static wand. The forward hookup person (door end) places apex fitting 1 onto the forward cargo hook. The aft hookup person places the apex fitting 2 onto the aft cargo hook. Do not use the center hook. The hookup team then carefully dismounts the container and remains close to the load as the helicopter removes slack from sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



APPENDIX A
NATIONAL STOCK NUMBERS FOR SLINGS,
NETS, AND SPARE PARTS
10,000-POUND CAPACITY SLING SET AND COMPONENTS

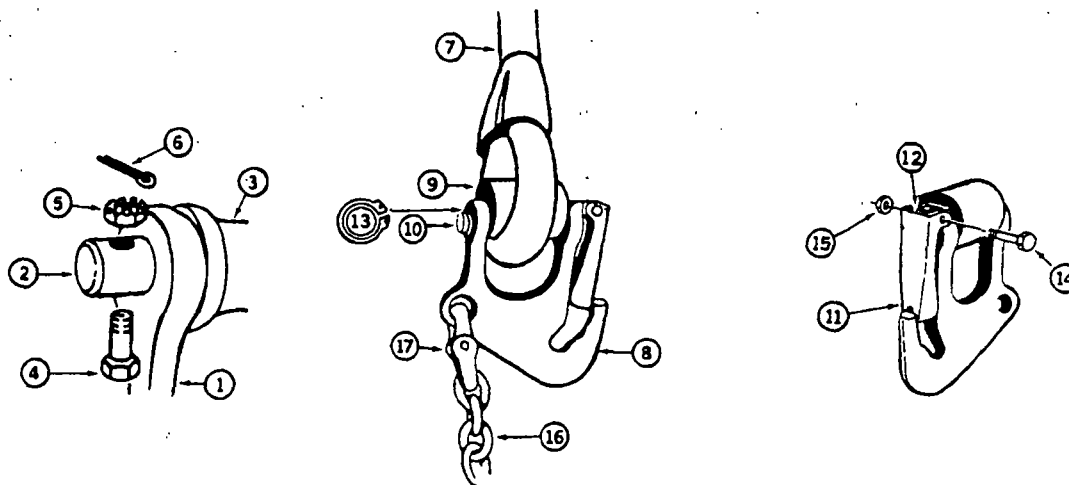


Figure A-1. 10,000- or 25,000-pound Capacity Sling Set (Circled Numbers Correspond with NSNs of Identified Part)

NSN	Part Number	Description	Qty
1670-01-027-2902	38850-00001-043	Sling set assembly, complete LiN T79003	1 ea
(1) 4030-01-048-4045	38850-00004-045	Apex fitting assembly	1 ea
(2) 5315-01-115-3482	38850-00008-101	Pin, apex fitting	1 ea
(3) 1670-01-235-0908	38850-00015-104	Spacer, apex	1 ea
(4) 5306-00-944-1536	NAS1306-16D	Bolt	1 ea
(5) 5310-00-207-9274	AN 320C6	Nut, castellated	1 ea
(6) 5315-00-234-1864	MS 24665-302	Cotter pin	1 ea
(7) 1670-01-047-6814	38850-00009-055	Rope assembly	4 ea
(8) 4030-01-048-4046	38850-00011-041	Grabhook assembly	4 ea
(9) 1670-01-109-2543	38850-00015-101	Spacer, grabhook	4 ea
(10) 5315-01-121-0497	38850-00008-103	Pin, spacer	4 ea
(11) 4030-01-100-1684	38850-00017-101	Keeper, grabhook	4 ea
(12) 5360-01-115-6833	38850-00019-101	Keeper spring	4 ea
(13) 5365-01-046-3670	MS 3217-1050	Snap ring	4 ea
(14) 5306-00-771-7621	NAS 1303-21	Bolt, shear	4 ea
(15) 5310-01-024-7080	MS 51865-6C	Nut, lock	4 ea
(16) 4010-01-058-4772	38850-00053-101	Chain, 8-foot length	4 ea
(17) 4010-01-193-9331	577-0615	Coupling, link	4 ea
8460-00-606-8366	MIL-K-41835	Kit bag, flyers	1 ea

15,000-POUND CAPACITY MULTILEG SLING ASSEMBLY

NSN	Part Number	Description	Qty
1670-00-902-3080	3900061	Sling, multileg assembly, LIN T80571, TAMCN B2030	1 ea
1670-00-946-8719	AC6000292	Web ring, assembly	1 ea
NA	MS24553-1	Link assembly, web ring	1 ea
1670-00-946-8631	3110167	Sling leg assembly	4 ea
NA	3910112-5	Keeper, 5-inch, leg assembly	4 ea
NA	3910112-1	Keeper, 6 1/4-inch, leg assembly	4 ea
NA	MS24553-1	Link assembly, sling leg	1 ea
NA	31610	Grab link	4 ea
NA	FE 7623-3	Keeper, grab link	4 ea
NA	34012-18	Spring, keeper, grab link	4 ea
5310-00-167-0818	AN960-10	Washer, keeper, grab link	4 ea
5315-00-812-3765	MS20392-2033	Pin, keeper, grab link	4 ea
5315-00-839-2325	MS24665-132	Cotter pin, keeper, grab link	4 ea
NA	31611	Coupling link	4 ea
NA	34080-4	Chain	4 ea

25,000-POUND CAPACITY SLING SET AND COMPONENTS

	NSN	Part Number	Description	Qty
	1670-01-027-2900	38850-00001-044	Sling set assembly, complete, LIN T79009	1 ea
1	4030-01-048-4044	38850-00004-046	Apex fitting assembly	1 ea
2	5315-01-119-9065	38850-00008-102	Pin, apex fitting	1 ea
3	1670-01-235-0907	38850-00015-105	Spacer, apex	1 ea
4	5306-00-944-2659	NAS 1306-22D	Bolt	1 ea
5	510-00-207-9274	AN 320C6	Nut, castellated	1 ea
6	5315-00-234-1864	MS 24665-302	Cotter pin	1 ea
7	1670-01-047-6815	38850-00009-056	Rope assembly	4 ea
8	4030-01-048-4047	38850-00011-046	Grabhook assembly	4 ea
9	1670-01-109-2544	38850-00015-102	Spacer, grabhook	4 ea
10	5315-01-121-2874	38850-00008-104	Pin, spacer	4 ea
11	4030-01-100-1685	38850-00017-102	Keeper, grabhook	4 ea
12	5360-01-115-6833	38850-00019-101	Keeper spring	4 ea
13	5365-00-261-3918	MS 3217-1075	Snap ring	4 ea
14	5306-00-771-7621	NAS 1303-21	Bolt, shear	4 ea
15	5310-01-024-7080	MS 51865-6C	Nut, lock	4 ea
16	4010-01-058-4771	38850-00053-102	Chain, 8-foot length	4 ea
17	4010-01-041-9751	664241	Coupling, link	4 ea
	8460-00-606-8366	MIL-K-41835	Kit bag, flyers	1 ea

40,000-POUND CAPACITY SLING SET AND COMPONENTS

NSN	Part Number	Description	Qty
3940-01-183-2118		Sling set assembly, complete, TAMCN B2035	1 ea
4838-01-199-9562	FE 8109-1	Apex shackle, assembly	1 ea
NA	FE 8109-5	Shackle	1 ea
NA	FE 8109-3	Pin, shackle, apex	1 ea
NA	FE 8109-2	Spacer, shackle, apex	1 ea
5306-00-944-1538	NA51306-21D	Bolt	1 ea
5310-00-176-8110	AN320-6	Nut, castellated	1 ea
5315-00-234-1864	MS24665-302	Cotter pin	1 ea
3940-01-194-9364	JETS WMC-2000	Sling leg	4 ea
4030-01-197-1629	FE 8103-1	Grab link, assembly	4 ea
NA	FE 8103-4	Spacer, grab link	4 ea
5306-00-151-1482	AN12-42	Bolt, grab link	4 ea
5310-00-167-1292	AN310-12	Nut, grab link	4 ea
5315-00-285-7161	MS24665-377	Cotter pin, grab link	4 ea
NA	FE 7623-3	Keeper, grab link	4 ea
5315-00-812-3765	MS20392-2033	Pin, keeper, grab link	4 ea
NA	34012-18	Spring, keeper, grab link	4 ea
5310-00-167-0818	AN960-10	Washer, keeper, grab link	4 ea
5315-00-839-2325	MS24665-132	Cotter pin, keeper, grab link	4 ea
4010-01-081-5114	577-0815	Coupling link	4 ea
NA	607050	Chain, 8-foot length	4 ea

FLAT WEB NYLON SLINGS
TYPE X NYLON AERIAL DELIVERY SLING

NSN	Description
3940-00-675-5001	Sling, endless donut, 10-inch
1670-00-393-0460	Ring assembly, 25,000-pound capacity

TYPE XXVI NYLON MULTILoop LINE

NSN	Description
1670-01-062-6301	2-loop, 3 foot
1670-01-062-6306	4-loop, 3 foot
1670-01-062-6304	2-loop, 9 foot
1670-01-062-6305	4-loop, 9 foot
1670-01-063-7760	2-loop, 11 foot
1670-01-062-6310	4-loop, 11 foot
1670-01-062-6303	2-loop, 12 foot
1670-01-062-6307	4-loop, 12 foot
1670-01-063-7761	2-loop, 16 foot
1670-01-062-6308	4-loop, 16 foot
1670-01-062-6302	2-loop, 20 foot
1670-01-064-4453	4-loop, 20 foot
1670-01-062-6309	4-loop, 28 foot
1670-01-062-6313	3-loop, 60 foot
1670-01-064-4454	6-loop, 60 foot
1670-01-062-6311	2-loop, 120 foot
1670-01-062-6312	6-loop, 120 foot
1670-01-107-7651	3-loop, 140 foot

5,000- AND 10,000-POUND CAPACITY CARGO NETS AND COMPONENTS

NSN	Part Number	Description	Qty
1670-01-058-3811	6018-5	Net, 5,000-pound capacity, LIN N02776, TAMCN J3121	1 ea
1670-01-058-3810	6018-10	Net, 10,000-pound capacity, LIN N02708, TAMCN J3120	1 ea
1670-01-070-5276	X6019	Apex fitting	1 ea
1670-01-067-9989	6020	Hook	4 ea
4020-01-118-5826	6018-15	Repair cord, used on part no. 6018-5	As req
4020-01-119-5994	6018-20	Repair cord, used on part no. 6018-10	As req
8030-01-152-2286	2300-3	Antiabrasion compound, olive drab	As req
8030-01-154-2327	1003	Antiabrasion compound, black	As req
1080-00-108-1155	13226E0964-2	Transport case	1 ea*
8460-00-606-8366	MIL-K-41835	Kit bag, flyers	1 ea*

* Alternate NSN is 1080-00-107-8580. These cases are designed and marked for use with the camouflage screen. Camouflage system markings should be replaced with "Helicopter External Cargo Net, 10,000-pound capacity."

PROTECTIVE EQUIPMENT

NSN	Description
4240-00-052-3776	Eye goggles
8415-01-158-9445	Gloves, electrical workers, size 9
8415-01-158-9446	Gloves, electrical workers, size 10
8415-01-158-9447	Gloves, electrical workers, size 11
8415-01-158-9448	Gloves, electrical workers, size 12
8415-00-268-7859	Gloves, leather
4240-00-759-3290	Headset (USAF)
4240-00-762-2582	Headset (USAF)
8415-00-071-8786	Helmet, flight deck (USN/USMC/USAF)

MISCELLANEOUS EQUIPMENT AND MATERIAL

NSN	Description
4030-00-360-0304	Clevis assembly, small, MS 70087-1
5305-00-726-2553	Bolt
5310-00-835-2037	Nut
4030-00-678-8562	Clevis assembly, medium, MS 70087-2
5305-00-940-8069	Bolt
5310-00-842-1190	Nut
4030-00-090-5354	Clevis assembly, large, MS 70087-3
5305-00-177-5617	Bolt
5310-00-891-3428	Nut
4030-00-162-9668	Clevis, screw pin, AN 116-14
4020-00-240-2146	Cord, nylon, Type III, 550-pound breaking strength
8305-00-958-3685	Felt sheeting, 1/2-inch thick, 30-inch wide
8305-00-191-1101	Felt sheeting, 1/2-inch thick, 60-inch wide
7520-00-079-0286	Ink, marking, parachute, orange-yellow, marker
7520-00-634-6583	Ink, marking, parachute, orange-yellow, liquid
7520-00-230-2734	Ink, marking parachute, strata-blue, marker
7520-00-286-5362	Ink, marking parachute, strata-blue, liquid
5825-00-917-3738	Light, beacon, beanbag
6260-01-074-4230	Light, chemical wand, 30-minute glow time
6260-00-106-7478	Light, chemical wand, 6-hour glow time
6260-01-074-4229	Light, chemical wand, 12-hour glow time
1670-00-783-5988	Link assembly, Type IV
1670-00-212-1149	MB-1 chain assembly, 10,000-pound capacity:
1670-00-516-8405	Adjuster assembly
1670-00-753-3928	Chain assembly
8135-00-664-6958	Pad, energy-dissipating, honeycomb
8135-00-808-6446	Padding, cellulose, 20-inch by 60-foot
8345-00-174-6865	Padding, cellulose, 24-inch by 125-foot
4020-00-231-2581	Panel, marker, red-yellow, VS-17
4020-00-968-1357	Rope, 3/8-inch, TR605
6850-00-264-9038	Rope, fibrous, 1/2-inch, MIL-R-17343
7510-00-266-5016	Solvent, dry cleaning, PD-680
7510-00-074-4969	Tape, adhesive, pressure-sensitive, 2-inch wide roll, green
	Tape, adhesive, pressure-sensitive, 2-inch wide roll, red

MISCELLANEOUS EQUIPMENT AND MATERIAL (CONTINUED)

NSN	Description
1670-00-725-1437	Tie-down strap, CGU-1/B, 5,000-pound capacity
5340-01-204-3009	Tie-down strap, web nylon, 5,000-pound capacity
1670-00-937-0271	Tie-down strap, web nylon, 10,000-pound capacity
5365-00-937-0147	D-Ring, aerial delivery
1670-00-937-0272	Load binder assembly
1670-00-360-0340	Quick-fit strap fastener
	Two-point link assembly components:
5306-00-435-8994	Bolt, 1-inch diameter, 4-inch long (2 each)
5310-00-232-5165	Nut, 1-inch diameter (2 each)
1670-00-003-1954	Plate, side, 5 1/2-inch long (2 each)
5365-00-007-3414	Spacer, large
1670-00-574-8044	Wand, static discharge
NA	Wand, static discharge, 3-foot, PN 1610AS100-1, TAMCN C6254
NA	Wand, static discharge, 5-foot, PN 1610AS100-2, TAMCN C6252
8305-00-082-5752	Webbing, nylon, tubular, 1/2-inch, 1000-pound breaking strength
8305-00-268-2411	Webbing, cotton, 1/4-inch, 80-pound breaking strength

EXTERNAL LIFT DEVICES

1670-00-587-3421	Bag, cargo, A-22, LIN B 14181, TAMCN C4070
3940-00-892-4380	Cargo net, 14-foot square, 10-inch mesh
3940-00-892-4374	Cargo net, 14-foot square, 8-inch mesh
1450-01-219-4360	Mk105 pendant
1450-00-414-7172	Mk105 hoisting sling assembly, 6,000-pound capacity
1450-00-881-8736	Mk105 sling leg assembly
1670-01-003-0803	Releasable swivel hook pendant sling AC6000500 Mod 1
1450-00-169-6927	Sling, pallet, Mk86, LIN S80670
1398-00-004-9175	Sling, pallet, Mk100, LIN S80738
1670-00-103-6617	Swivel hook sling leg, AC6000153 (USMC, USN)

APPENDIX B

SLING CONVERSION TABLES

SLING CONVERSION TABLES			
10,000-POUND SLING SET CHAIN LINK NUMBER	25,000-POUND SLING SET CHAIN LINK NUMBER	40,000-POUND SLING SET CHAIN LINK NUMBER	15,000-POUND MULTILEG SLING SET CHAIN LINK NUMBER
3	3	3	51
4	4	4	52
5	4	4	52
6	5	5	53
7	6	6	54
8	6	6	54
9	7	7	55
10	8	7	56
11	9	8	57
12	9	9	57
13	10	9	58
14	11	10	59
15	11	11	59
16	12	11	60
17	13	12	61
18	14	13	62
19	14	13	62
20	15	14	
21	16	15	No further conversions for 15,000 pound multileg sling set.
22	16	15	
23	17	16	
24	18	16	
25	19	17	
26	19	18	
27	20	18	
28	21	19	
29	21	20	
30	22	20	
31	23	21	
32	24	21	

SLING CONVERSION TABLES (CON'T)

10,000-POUND SLING SET CHAIN LINK NUMBER	25,000-POUND SLING SET CHAIN LINK NUMBER	40,000-POUND SLING SET CHAIN LINK NUMBER	15,000-POUND MULTILEG SLING SET CHAIN LINK NUMBER
33	24	22	No further conversions for 15,000-pound multileg sling set.
34	25	22	
35	26	23	
36	27	24	
37	27	24	
38	28	25	
39	29	25	
40	30	26	
41	31	26	
42	31	27	
43	32	28	
44	33	28	
45	34	29	
46	34	29	
47	35	30	
48	36	30	
49	37	31	
50	38	32	
51	39	32	
52	39	33	
53	40	33	
54	41	34	
55	42	34	
56	43	35	
57	44	36	
58	45	36	
59	45	37	
60	46	37	
61	47	38	
62	48	38	
63	49	39	
64	50	40	
65	50	40	
66	51	41	
67	52	41	
68	53	42	
69	54	42	
70	54	43	
71	55	44	
72	56	44	
73	57	45	
74	57	46	

SLING CONVERSION TABLES (CON'T)

10,000-POUND SLING SET CHAIN LINK NUMBER	25,000-POUND SLING SET CHAIN LINK NUMBER	40,000-POUND SLING SET CHAIN LINK NUMBER	15,000-POUND MULTILEG SLING SET CHAIN LINK NUMBER
75	58	46	No further conversions for 15,000-pound multileg sling set.
76	59	47	
77	60	48	
78	61	48	
79	61	49	
80	62	49	
81	63	50	
82	64	51	
83	65	51	
84	65	52	
85	66	53	
86	67	53	
87	68	54	
88	68	55	
89	69	55	
90	70	56	
91	71	57	
92	72	57	
93	72	58	
94	73	58	
95	74	59	
96	75	60	
97	76	60	
98	76	61	
99	77	62	
100	78	62	
101	79	63	
102	79	64	
103	80	64	
104	81	65	
105	82		
106	83		
107	83		
108	84		



GLOSSARY

ADCGS	aviation direct generator set	LTR	light tactical floating raft bridge
AGPU	aviation ground power unit	LVAD	low velocity airdrop
ASK	acoustic suppression kit	MCRDAC	Marine Corps Research, Development and Acquisition Command
BCP	battery command post	MDS	meteorological data system
CFM	cubic feet per minute	MGB	medium girder bridge
CG	center of gravity	MICLIC	mine clearing line charge
CLFFK	company level field feeding kit	MILVAN	military-owned demountable container
CNCE	communications nodal control element	mm	millimeter
CONEX	container express	MSFDCS	Multiservice Flight Data Collection Sheet
DDSS	downsized direct support	MTMCTEA ...	Military Traffic Management Command Transportation Engineering Agency
decon	decontamination	NA	not applicable
DOD	Department of Defense	NAVAIR	Naval Air Systems Command
EAT	external air transport	NC	node center
ECU	environmental control unit	NRDEC	Natick Research, Development, and Engineering Center
EMI	electromagnetic impulse	NSN	national stock number
FARE	forward area refueling equipment	OVE	operator vehicle equipment
FME	field maintenance equipment	PCP	platoon command post
FOPS	falling objects protection structure	PSV/MC	platoon support van/maintenance center
gp	general purpose	QRSA	quick reaction satellite antenna
gph	gallons per hour	RDF	radio direction finder
Gpm	gallons per minute	ROPS	roll-over protection system
HATS	hardened Army tactical shelter	ROWPU	reverse osmosis water purification unit
HE	high explosive	RT	rough terrain
HEAT	helicopter external air transport	SCAMP	self-propelled crane for Army aircraft maintenance and positioning
HEMAT	heavy-expanded mobility ammunition trailer	SCC	system control center
HIPIR	high-power illuminator radar	SEE	small emplacement excavator
HMMH	high mobility materiel handler	SEN	small extension node
HMMWV	high-mobility multipurpose wheeled vehicle	SIXCON	six-compartment container
IDASC	improved direct air support center	SPAM	shop, portable aircraft maintenance
ISO	International Organization of Standardization		
kw	kilowatt(s)		
lb	pound		
LEN	large extension node		
LIN	line number		
LOS	line of sight		

TAFDS tactical airfield fuel
dispersing system
TAMCN Table of Authorized Material
Control Number
TOW tube-launched, optically
tracked, wire-guided

TTW teletypewriter
USA United States Army
USMC United States Marine Corps

REFERENCES

REQUIRED PUBLICATIONS

Required publications are sources that users must read in order to understand or to comply with this publication.

FIELD MANUAL

55-450-3 Multiservice Helicopter External Air Transport:
 Basic Operations and Equipment

MILITARY STANDARD

209G Slinging and Tie-Down Provisions for Lifting and
 Tying Down Military Equipment



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11 FEBRUARY 1991

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DISTRIBUTION:

Active Army, USAR, and ARNG: To be distributed in accordance with DA Form 12-11E, requirements for FM 55-450-5, Multiservice Helicopter External Air Transport: Dual Point Loading Rigging Procedures (Qty rqr block no. 4649)



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Pages

S/S By Chg 1 7 Jan 93

FM 55-450-5/FMFRP 5-31, VOL III/NWP 42-1, VOL III/AFR 50-16, VOL III/
COMDTINST M13482.4

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CHAPTER 1

FUNDAMENTAL PRINCIPLES

This chapter contains general information about certification for helicopter external air transport (EAT) and explains the role of the Military Traffic Management Command Transportation Engineering Agency (MTMCTEA) and the Department of Defense (DOD) EAT certification authority. This authority rests with the US Army Natick Research, Development, and Engineering Center (NRDEC). This chapter also explains the information contained in the equipment rigging procedures and gives some general rigging instructions.

CLASSIFICATION DEFINITIONS OF EXTERNAL AIR TRANSPORT LOADS

Certified EAT Loads

Certified EAT loads are those items of equipment and their associated rigging procedures which have completed the evaluation and testing required by NRDEC for EAT certification. These rigging procedures are in Chapter 2. Only Certified EAT loads are authorized for the Marine Corps.

Suitable EAT Loads

Suitable EAT loads are those items of equipment and their associated rigging procedures that have not been certified but have demonstrated acceptable static lift and flight characteristics during a flight test by the US Army TEXCOM Airborne and Special Operations Test Board. In most cases, the lifting provisions have not been tested according to the applicable military standard. These rigging procedures are in Chapter 3.

Unique EAT Loads

Unique EAT loads are items of equipment and their associated rigging procedures which have been certified or determined to be suitable for EAT but have significant

changes to a load parameter, such as weight or a change in the aircraft used to carry the load, such as a load certified with a UH-60 and now carried under a CH-46. Unique loads are also equipment carried on a onetime or low-frequency basis, such as telephone poles, artillery targets, or barrier material.

Prohibited EAT Loads

Prohibited EAT loads are items of equipment that are prohibited from EAT as determined by each service. These loads have been denied EAT certification and are a safety hazard if carried. They have either structural deficiencies or have exhibited unstable flight characteristics during flight testing. Each service will identify these loads and transmit this information by separate list.

Contact your service point of contact identified in the Preface if you have any questions regarding the classification of a particular load.

CERTIFICATION OF EQUIPMENT FOR HELICOPTER EXTERNAL AIR TRANSPORT

The objective of helicopter EAT certification is to assure the user that the

equipment being transported can withstand the stresses of an EAT flight environment. Certification for EAT assures the user that the item has met minimum standards for structural integrity and that the associated rigging procedures have been developed specifically for that item.

Within the US Army, the MTMCTEA is responsible for transportability approval of developmental equipment. Within the DOD, NRDEC is the lead activity responsible for providing EAT certification and rigging procedures for military equipment. When an item is certified for EAT, it means that NRDEC, in cooperation with various test activities, has--

- Conducted an engineering analysis of the load and lifting provisions for structural adequacy during EAT.
- Verified that the lift provisions meet the strength requirements of the applicable military standard by means of proof load testing.
- Developed and/or validated EAT rigging procedures through static lift testing.
- Evaluated flight test reports and determined that the particular load meets acceptable flight characteristics with the type helicopter flown during the flight test.
- Issued a statement of EAT certification for the particular load, including load configuration(s), weight(s), types of helicopter(s), and maximum stable airspeed(s) as attained during the flight test(s). Certification is valid only for the conditions specified in the rigging procedures.

REQUESTS FOR EAT CERTIFICATION

Fielded Equipment

Each service headquarters must designate, request, and prioritize the fielded equipment to be evaluated by NRDEC for EAT certification. The following agencies are responsible for their branch of service:

- US Army - US Army Transportation School, ATTN: ATSP-CD, Fort Eustis, VA 23604-5391.
- US Marine Corps - Marine Corps Research, Development and Acquisition Command (MCRDAC), ATTN: Code SSE/T&E, Quantico, VA 22134-5080.
- US Navy - Naval Air Systems Command (NAVAIR).
- US Air Force - US Air Force Systems Command.

Individual units can request EAT certification for fielded equipment through the appropriate service agency which will add the item to the prioritized list. The NRDEC will evaluate the equipment on a priority basis.

Previously Certified Single-Point Loads

Organizations can request certification for single-point loads transported by helicopters not listed in the applicability paragraph of the certified single-point load rigging procedure. The procedure for certifying a single-point load for EAT under a different helicopter from that listed in the applicability paragraph is as follows.

- Contact your service point of contact to determine if the load has been certified with the different helicopter subsequent to the manual publication.
- Obtain a multiservice flight data collection sheet (MSFDCS) from Commander, NRDEC, ATTN: STRNC-UAS, Natick, MA 01760-5017.
- Following the steps in the MSFDCS, conduct a flight test for the item using the certified single-point rigging procedures in this manual.
- Complete the MSFDCS and return it to NRDEC. NRDEC will evaluate the completed MSFDCS and certify the item as appropriate for the specified helicopter.

Previously Certified Dual-Point Loads

Loads cannot be certified for dual-point lift based on previously certified dual-point rigging procedures because of the differences in dual-hook helicopters, such as the distance between the two cargo hooks. Rigging procedures for dual-point loads must be developed and/or approved by NRDEC before the test flight.

UNIQUE ITEMS OF EQUIPMENT OR OPERATIONAL REQUIREMENTS

Helicopter external air transport of unique items, due to operational requirements, will be at the discretion of the commander. Equipment not listed in this manual should be static lifted (when possible) by a crane to determine proper rigging and stability characteristics. Personnel thoroughly familiar with EAT rigging procedures should assist in the static lift testing. Flight testing may be conducted after a satisfactory static rigging configuration has been determined.

Suitable loads that have been routinely and safely flown in the past will continue to be flown if units are to accomplish assigned missions. The lack of EAT certification in itself does not preclude a unit commander from carrying a load that is not certified. Each service is responsible for determining its policy on carrying loads that have not been certified for EAT.

NOTE: Low density equipment with low weight and large surface area (flat surfaces), such as shelters, empty trailers, pallet loads, and empty fuel or water drums, are likely to become extremely unstable when flown during EAT, even at low airspeeds, and should be flown with extreme caution.

EQUIPMENT RIGGING PROCEDURES

This section explains the information that is contained in the rigging procedures for each load. Chapters 2 and 3 contain the

rigging procedures for certified and suitable single-point loads, respectively.

2 Applicability Paragraph

The applicability paragraph states whether a load is "certified" or "suitable" for EAT. It also contains the helicopter types and recommended maximum airspeeds for each helicopter type. For certified loads, this airspeed is the maximum airspeed attained by the helicopter during the test flight before the load became unstable or before the aircraft power requirements were exceeded. For suitable loads, the maximum recommended airspeed is based on previous experience with this helicopter/load combination. For either certified or suitable loads, the airspeed listed is a recommendation and not a restriction, unless so stated. The aircrew should closely monitor the load during the flight, especially if the helicopter exceeds the recommended maximum airspeed.

Load Description

The load description paragraph identifies the load, model, National Stock Number (NSN) or other identification, and the weight of the load for certification. The actual weight of the equipment may vary somewhat from the actual rigged weight during the flight test due to equipment modifications, fuel, equipment added to the load, or different models of the same item. The load weight on the equipment data plate or in the operator's manual takes precedence over the load weight in this manual. Weigh the load if there is any doubt about its actual weight. If the load weight exceeds the weight listed in the load description paragraph, the load becomes a unique load. Contact your service point of contact if you have any questions about the load description or weight.

Equipment such as cargo trailers and cargo trucks contain descriptions of the allowable additional cargo weight. Do not exceed the fully loaded weight. Some trailers become extremely unstable at low weights; therefore, a minimum weight is identified. If your trailer is below that weight, add more cargo

or dummy weight as close to the center of the trailer as possible until you reach the minimum weight.

Preparation

The preparation steps are intended to reduce the possibility of damage to the equipment caused by sling leg entanglement during the hookup and lift-off operation or by wind resistance encountered during the flight. Since these preparation steps are not directive in nature, the commander assumes responsibility for any damage to the equipment caused by deviation from the preparation steps.

Rigging

The rigging steps give information as to the position of the apex fitting on the load, routing orientation of the sling legs, location of the lift provisions, chain link number for each sling leg, and steps required to prevent the sling legs from becoming entangled on the load. Do not change the chain link number in the rigging procedures under any circumstances as it may change sling leg loading and cause lift provision failure.

The purpose of the illustration accompanying the rigging procedures is to depict what a properly rigged load looks like with the slack removed from the sling legs. The arrow identifies the direction of flight.

Appendix A contains NSN component listings for slings, sling sets, cargo nets, and other miscellaneous equipment and materials.

GENERAL RIGGING INSTRUCTIONS

WARNING

Inspect lifting provisions and supporting structure for damage or degradation prior to EAT. Do not transport loads with damaged or degraded lift provisions.

Prepare the load to be transported by following the preparation and rigging instructions for each item. Typical preparation instructions will provide information to secure loose items, remove or secure canvas covers, and remove obstructions, such as antennas. Place protective padding on windshields and other components that could be damaged by the metal parts of the sling set during hookup or release. The load should be secure enough to withstand winds in excess of 120 knots caused by the forward airspeed of the aircraft.

If possible, position the load in the takeoff direction so the pilot does not have to pick the load up and then turn the aircraft into the takeoff direction.

Assemble and inspect the slings and miscellaneous equipment required to prepare and rig the load. Following the instructions in Chapter 6 of the first volume in this set, add or remove sling legs, chains, or apex fittings as required. Never exceed the capacity of the sling legs or apex fitting/web ring. If you have a sling set with a higher capacity than the sling set prescribed, use the chain link conversion chart in Appendix B to determine the corresponding chain link for your sling set.

Position the sling set near the load. The sling legs for a typical load with four lifting points are routed as shown in Figure 1-1.

Rigging a typical load with four lifting points is begun by connecting--

- Sling leg 1 to the left front lifting provision.
- Sling 2 to the right front lifting provision.
- Sling leg 3 to the left rear lifting provision.
- Sling leg 4 to the right rear lifting provision.

If a six-leg sling set is required, the innermost sling legs, 5 and 6, are connected to the left and right middle lift provisions.

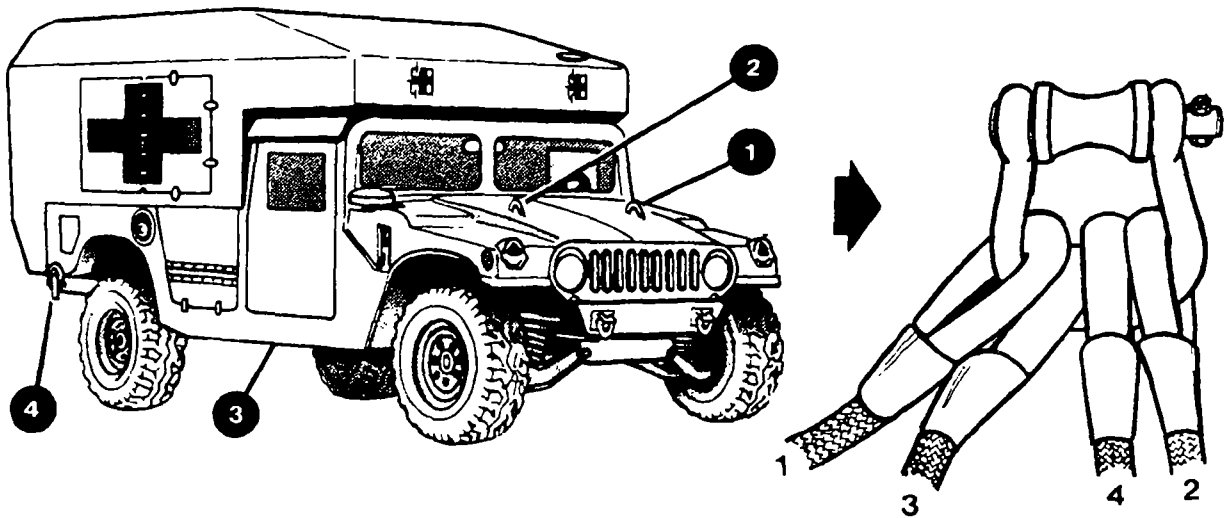


Figure 1-1. Sling Leg Lifting Point Designation

Odd numbered sling legs go to the same side of the load.

Left, right, front, and rear directions are designated from the driver's perspective for vehicles and towed equipment. Howitzer gun tubes are considered the front of the load. The front or rear is identified on other items of equipment. The sling leg numbering system prevents sling legs from crossing each other and causing damage to the sling legs or causing the load to twist in flight. To improve flight stability, some loads are transported backwards. Do not confuse the front of the load as it is carried with the end designated as the front for rigging purposes. The arrow with the illustration identifies the direction of flight.

Following the equipment rigging procedures, loop the free end of the chain end through the lift provision and insert the specified chain link in the grabhook/grab link. Tie or tape the excess chain end to prevent the unrestrained chain from damaging the load. If necessary, wrap padding around the chain or rope assembly to prevent damage to the load or sling set. If the procedures prescribe a spreader bar, install and pad it according to the rigging instructions.

Breakaway technique tape/cotton webbing is used to temporarily restrain the sling legs to keep them from becoming entangled on the load as the helicopter lifts the load.

A-22 CARGO BAG RIGGING INSTRUCTIONS

The A-22 cargo bag is an adjustable cotton duck cloth/nylon and nylon webbing container consisting of a sling assembly, cover, and four suspension webs. The bag is used to transport palletized loads, loose cargo, ammunition, drums, and other general cargo. Maximum weight capacity is 2,200 pounds. You may rig the cargo in the bag with or without the cover.

The best way to learn about this carrying device is to rig and derig it several times. Figures 1-2 through 1-6 and the following steps explain how to rig an A-22 cargo bag:

Step 1 - Spread the suspension web assembly on the ground near the cargo to be transported. Make sure the lateral straps are facing the ground. The fat lip portion of the friction adapter on the suspension web assembly must face down to ensure correct rigging when the cover and suspension assembly are folded up around the load.

Step 2 - Center the cover (lacing loops/eyelets down) on the sling assembly, making sure that the cover edges are even with the scuff pad of the suspension web assembly.

Step 3 - Center the load on the canvas/nylon cover (Figure 1-2). Place the load so that any sharp corners or objects are toward the center of the load, if possible. Use cushioning material to protect the cover, if necessary.

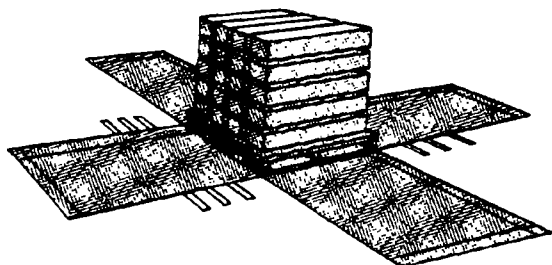


Figure 1-2. Centered Load

Step 4 - Fold the panels of the canvas/nylon cover over the top of the load. Fold any excess cover material under the top flap.

Step 5 - Using lacing cord or Type III nylon cord, secure the cover at each corner by running the cord through the lacing loops in a figure-eight design (Figure 1-3). Tie the cord ends with a bow knot and secure. The purpose of the cord is to tighten the cover around the load so that small items cannot fall out.

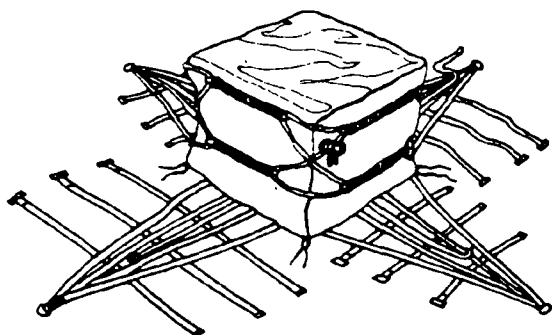


Figure 1-3. Securing the Cover with Lacing Cord

Step 6 - Route the 188-inch strap over top of the load. Route the free end under the floating safety bar (smooth side) and back over the friction adapter (rough side). Tighten the strap, fold in 8- to 10-inch loops, and secure (Figure 1-4).

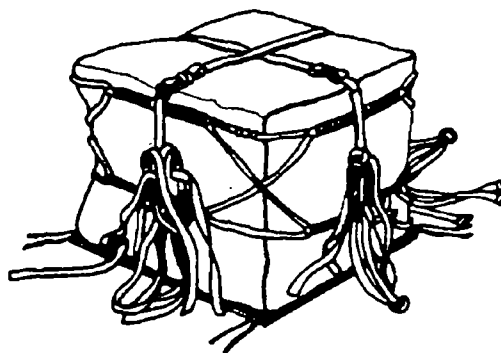


Figure 1-4. Securing the Strap

Step 7 - Pull the lower lateral straps to the corners of the load. Route the free end under the floating bar and back over the friction adapter. Attempt to tighten all four lower lateral straps equally. Repeat this step using the middle lateral straps.

Step 8 - Fasten the upper lateral straps in the same manner as in step 7 (Figure 1-5). If the load is not high enough for the upper lateral straps to go around the load, pull the suspension webs to their full height, and fasten the upper straps diagonally across the top corner of the load. Strap fasteners should be tightened to within 4 to 5 inches of the upper lifting legs.

Step 9 - Connect the four snap fasteners on the 24-inch suspension web straps to the sling assembly D-rings. Make sure the open or hook side of each butterfly snap is facing inward. Tape each butterfly snap to prevent the hooks from becoming entangled on the nylon cord or straps.

Step 10 - Attach the four suspension web strap D-rings to a medium clevis in a clockwise sequence. Each strap can have a maximum of one twist to connect to the clevis (Figure 1-6).

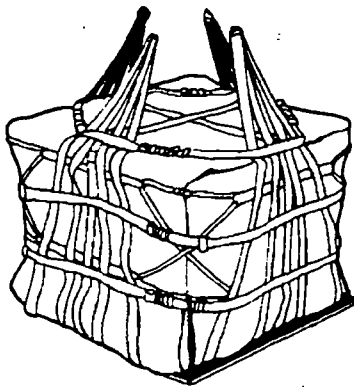


Figure 1-5. Fastening Upper Lateral Straps

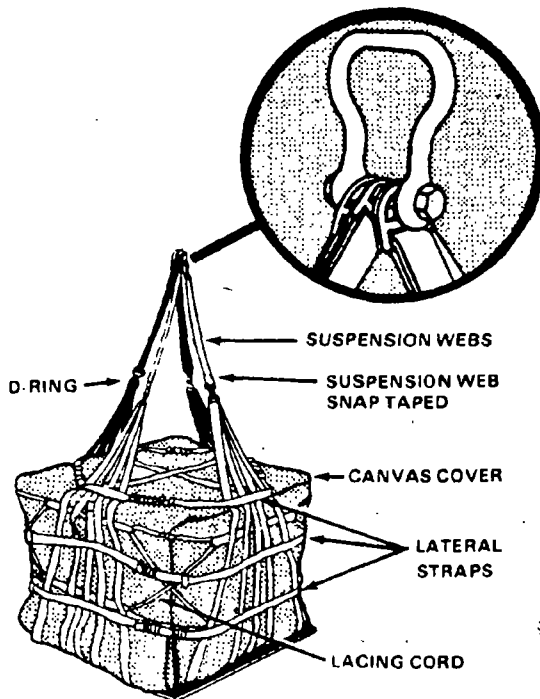


Figure 1-6. Upper Sling and Medium Clevis

Step 11 - Adjust all straps until the sling assembly fits snugly around the load. Fold and secure any excess webbing.

Step 12 - Prepare the load for pickup by looping the chain end of a sling leg through

the medium clevis and inserting link 3 in grabhook.

CARGO NET RIGGING INSTRUCTIONS

The 5,000- and 10,000-pound capacity octagon-shaped cargo nets are constructed from interwoven nylon cord. Each set of four lifting legs has a hook that attaches to the apex fitting. The other ends of the lifting legs are attached to the outer border cord. The apex fitting can be connected directly to the aircraft cargo hook. A diamond-shaped load zone area is marked by a yellow cord interlaced with the net mesh. This zone marks the center of the net and is used as a guide to place the load.

When positioning the load, the sides of the load can extend beyond the load zone, but the overhang should be the same on each side. The apex fitting is attached by a tether cord to the set of lifting legs with the net identification tag.

The olive drab body of the 5,000-pound capacity cargo net is 15 feet wide. Mesh size is 6 inches, and the net weighs 58 pounds. Volume capacity is 125 cubic feet.

The 10,000-pound capacity cargo net is black, and the body is 18 feet wide. It is constructed from a heavy weave nylon braid with 7 1/2 inches between mesh. The net weighs 96 pounds and has a volume capacity of 380 cubic feet.

When preparing to rig a net, remember the following rules:

- Never exceed the weight limits of the net.
- Do not transport cargo having sharp edges or protrusions without first covering the edges so they will not damage the net.
- Do not carry small items that could slip through the mesh. Use a canvas liner.

Follow these instructions when rigging the net:

Step 1 - Spread the net out on the ground. Have four persons pull evenly on each of the four lifting legs to open the net to its fullest

extension over the spot where the net is to be loaded (Figure 1-7). This will prevent overlap of the net under the pallets or load.

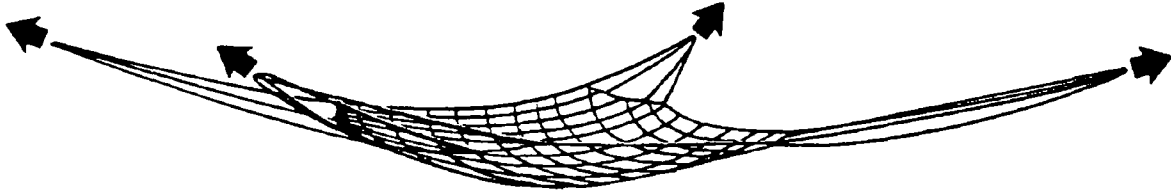


Figure 1-7. Fully Extended Net

Step 2 - Inspect the net. Repair as necessary. Inspect the pallet or load and make sure that banding material and pallet frame will not puncture, cut, or tear net. Tape over sharp edges with pressure-sensitive tape.

CAUTION: When forklifts are used to move pallets onto the nets, move the lifting legs to one side so that they will not be damaged by the tires. Do not allow the pallet or the under carriage of the forklift forks to drag on the net surface. The forklift forks could tear the net and pull it out from under the load. If the net is pulled out, the load may not be centered or could be unstable in flight.

Step 3 - Align the load on the net so that the sides of the load are parallel with the yellow cord (Figure 1-8). The load may overlap the yellow cord. The load's center of gravity will be near the center of the net. The lifting legs will be on the side of the load, not on the corners. If the load is loose cargo, place the cargo on the net with the heaviest items in the center and the lighter items toward the sides or on top of heavier items.

Step 4 - Position one person on top of the load with the apex fitting. Legs are hooked to the apex in the following sequence: 1, 3, 2, and 4, to provide equal lift on all legs (Figure 1-9). Hooks do not have to face in the

same direction. After connecting all four hooks to the apex fitting, tape or tie the four hooks together to prevent them from coming unhooked when the apex is laid down (Figure 1-10).

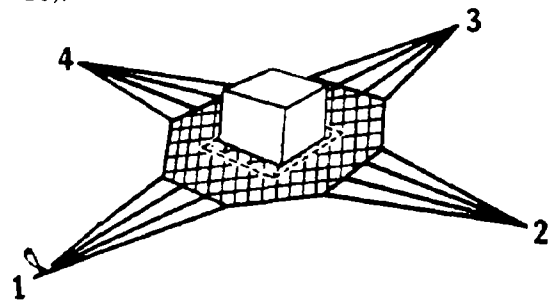


Figure 1-8. Aligned Load

Step 5 - All four sides of the net are now ready to be pulled up around the load. Begin by having the person on top of the load hold the apex up and another person tape or tie all 16 lifting legs together at 3- to 4-foot intervals until no more slack can be pulled up on the legs. If the load is small, you may have to tape or tie the net together above the load. Tape or tie the legs and net so that the net does not snag on the load as the helicopter lifts the net (Figure 1-11). Use breakaway technique so that the tape or tie breaks after the slack is removed from the legs and net.

Step 6 - Lift the sides of the net up while taping the legs so that the net does not get caught on the pallet or load protrusions (Figure 1-12).

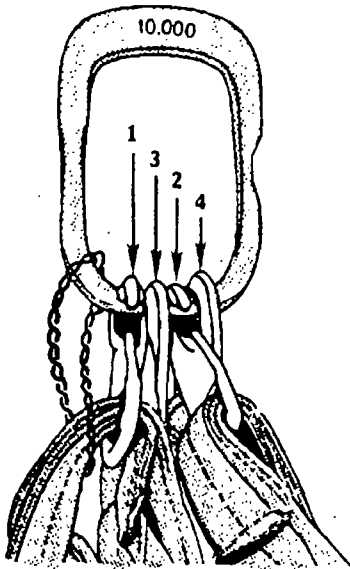


Figure 1-9. Legs Hooked in Sequence

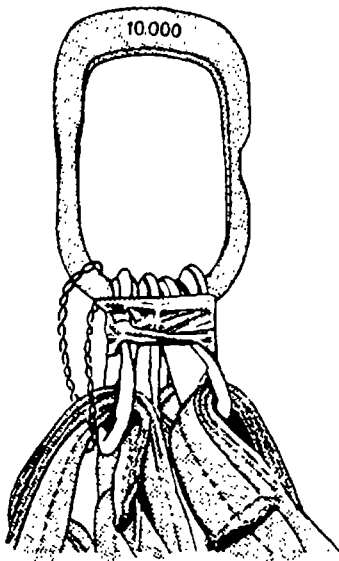


Figure 1-10. Taped Hooks

Step 7 - After you finish taping the legs, pull the net outward at each corner, grasp the border cord from each side near the corner of the load, and tape the border cords together to tighten the sides of the net. Take the excess netting at the corner and tape to the

adjoining side. At each side, pull the net up as high as possible and tape it to prevent it from snagging on the load and tearing the net (Figure 1-13). Use only enough tape to hold the net in place on the load. **DO NOT** tape net to load.

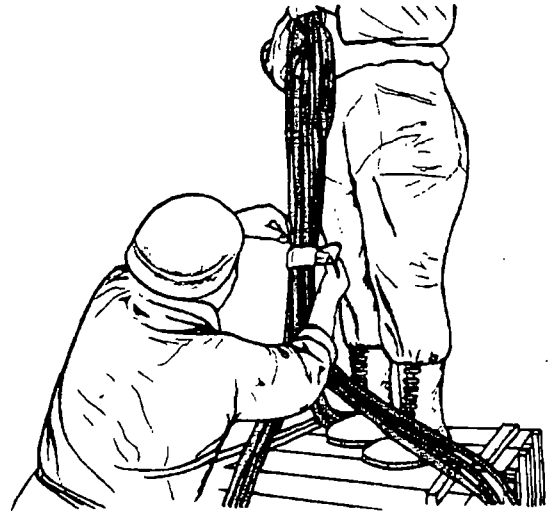


Figure 1-11. Taping Lifting Legs

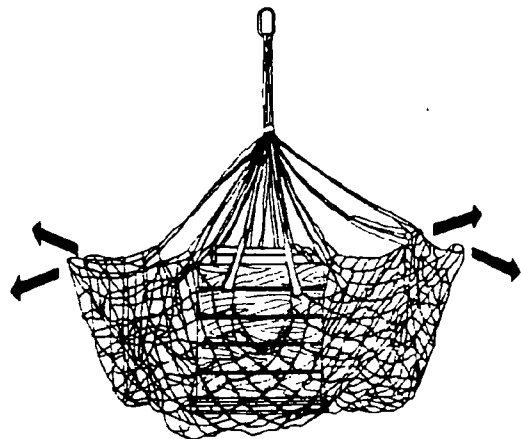


Figure 1-12. Net Pulled Outward from the Load

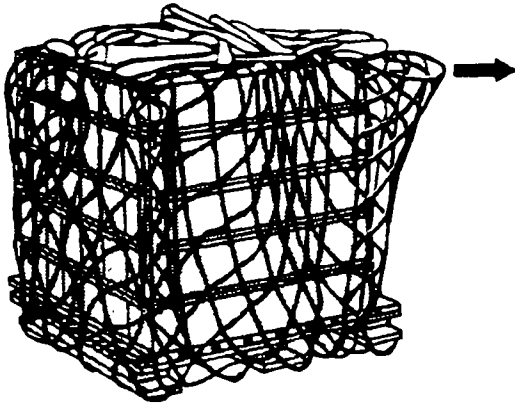


Figure 1-13. Excess Net Taped to Itself

Step 8 - Coil the lifting legs on top of the load. The net is now ready for hookup to the helicopter (Figure 1-14).

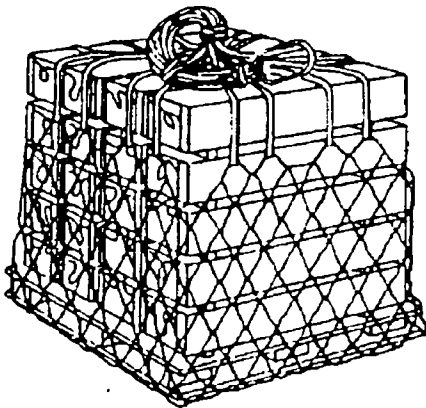


Figure 1-14. Lifting Legs Coiled on Top of Load

If the load must be moved, carefully guide the forklift forks through the net and into the pallet slots. Pallets can be stored temporarily with nets around them. They

should not be stored on concrete. Place empty pallets on the concrete surface and set the netted pallet on top of it.

Step 9 - Normally the net apex fitting is directly attached to the cargo hook. If the load is a large one, the lifting legs may not be long enough to allow the hookup person to perform a safe hookup to the aircraft. If you cannot lift the apex fitting at least 6 feet above the top of the load, add a leg or legs from a sling set (Figure 1-15). Route the chain end of the sling leg through the net apex fitting and insert link 3 in the grabhook. Remember, the capacity of the sling leg must be greater than the weight of the load.

Step 10 - Before hookup to the aircraft, make a final inspection of the apex fitting, netting, and taping to ensure the net and the load is still secure.

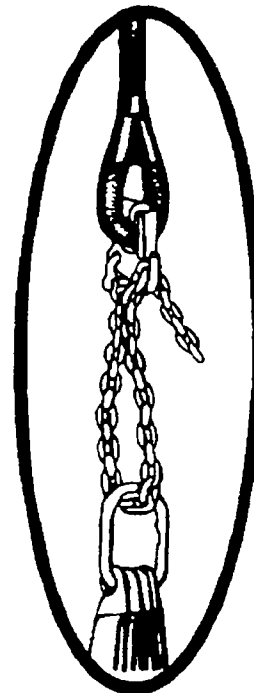
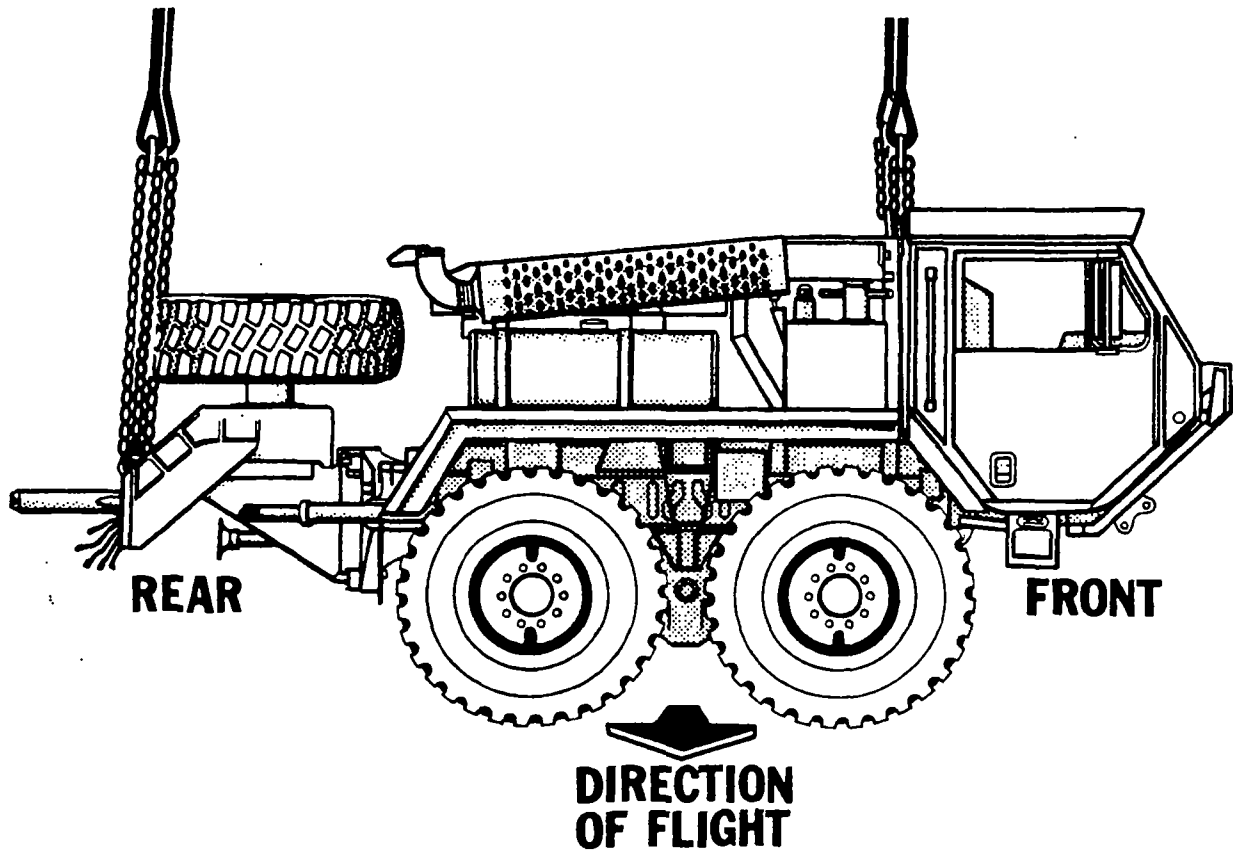


Figure 1-15. Adding a Sling Leg



TRAILERS

The certified dual-point rigging procedures for trailers are in this section. Figures 2-8 through 2-14 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-8. M101A2 3/4-Ton Trailer

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 100 knots.

LOAD DESCRIPTION

- M101A2 3/4-ton cargo trailer, LIN W95537.
- Weight:
 - Empty, 1,280 pounds.

WARNING

Do not transport the M101A2 trailer at gross weights of less than 1,575 pounds because it is extremely unstable and can contact the underside of the helicopter. Any M101A2 that is lighter than 1,575 pounds must have additional cargo or dummy weight placed as close to the center of the trailer bed as possible.

- Loaded:

VARIANTS	CURB WEIGHT (pounds)
Command Version 1 Trailer	1,958
Command Version 2 Trailer	1,981
LEN Cable Trailer	2,796
NC Support Trailer	2,643
Maintenance Trailer #2	1,430
Battalion Spares Trailer #1	1,594
Battalion Spares Trailer #2	2,206

WARNING

Maximum weight during EAT operations for any variant of the M101A2 is 3,000 pounds.

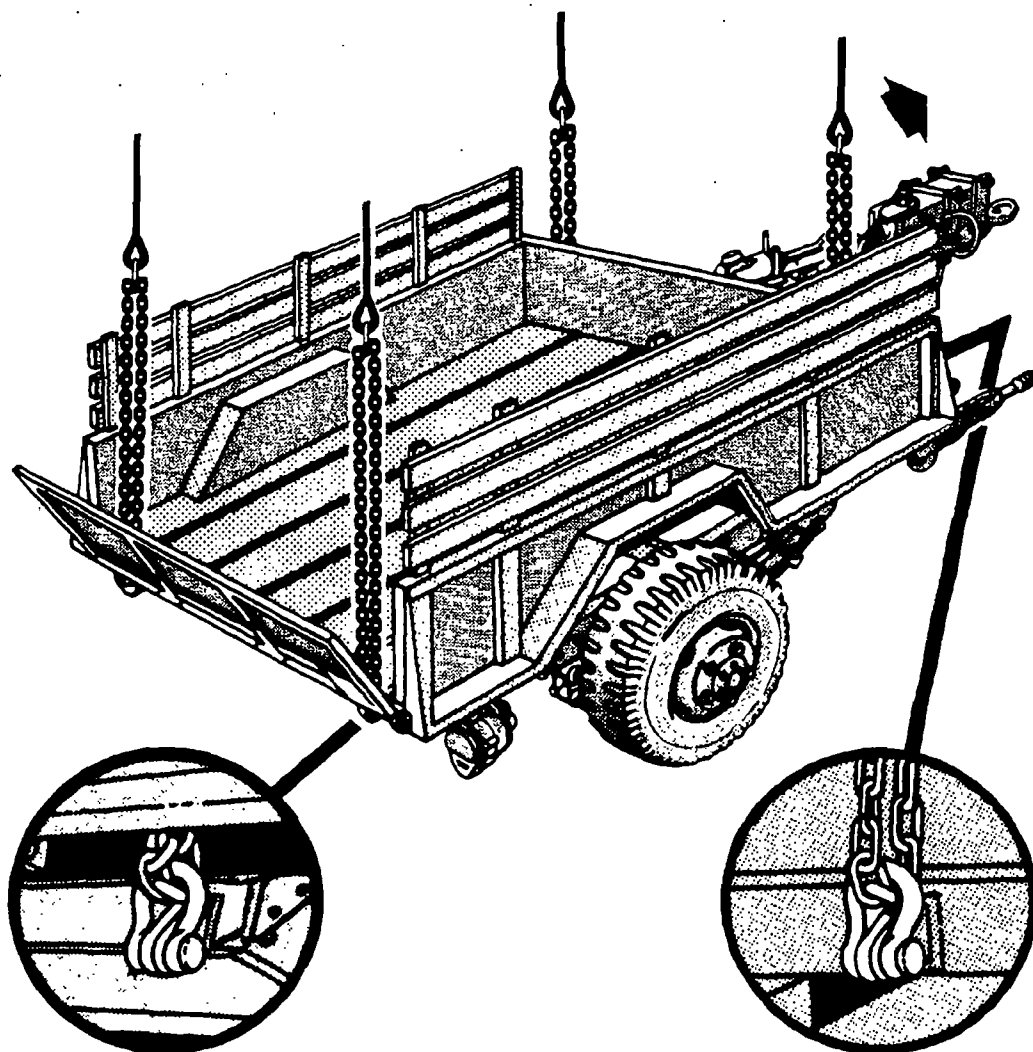


Figure 2-9. M871A1 Semitrailer

APPLICABILITY

This semitrailer, when empty, is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 80 knots. This trailer cannot be transported by the CH-53E because of the front to rear weight distribution.

LOAD DESCRIPTION

- M871A1 22 1/2-ton semitrailer, LIN S70027.
- Weight: 15,630 pounds empty.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Cord, nylon, Type III, 550-pounds breaking strength.
- Tie-down strap, cargo, CGU-1/B, as required.

PERSONNEL

Two persons can prepare and rig the load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Remove any cargo from the trailer bed. This trailer cannot be transported by helicopter with any cargo in the bed.
- Level the trailer by adjusting the landing gear.
- Remove the sideboards and tailgate panels and secure them to the front of the trailer in their standard storage location according to TM 9-2330-358-14&P. Use tie-down straps or equivalent to secure the panels to trailer. Make sure the panels are securely lashed so they will not come free during transport.
- Secure compartment doors with tape or nylon cord.
- Secure the spare tire in its storage compartment with nylon cord to prevent movement during flight.
- At each lifting provision location, pull down on the latch and push out on the bolt at the inboard end of each lifting eye. Slide the lifting eye out from the housing as far as it will go. Do not lift the semitrailer unless each lifting eye is fully extended.

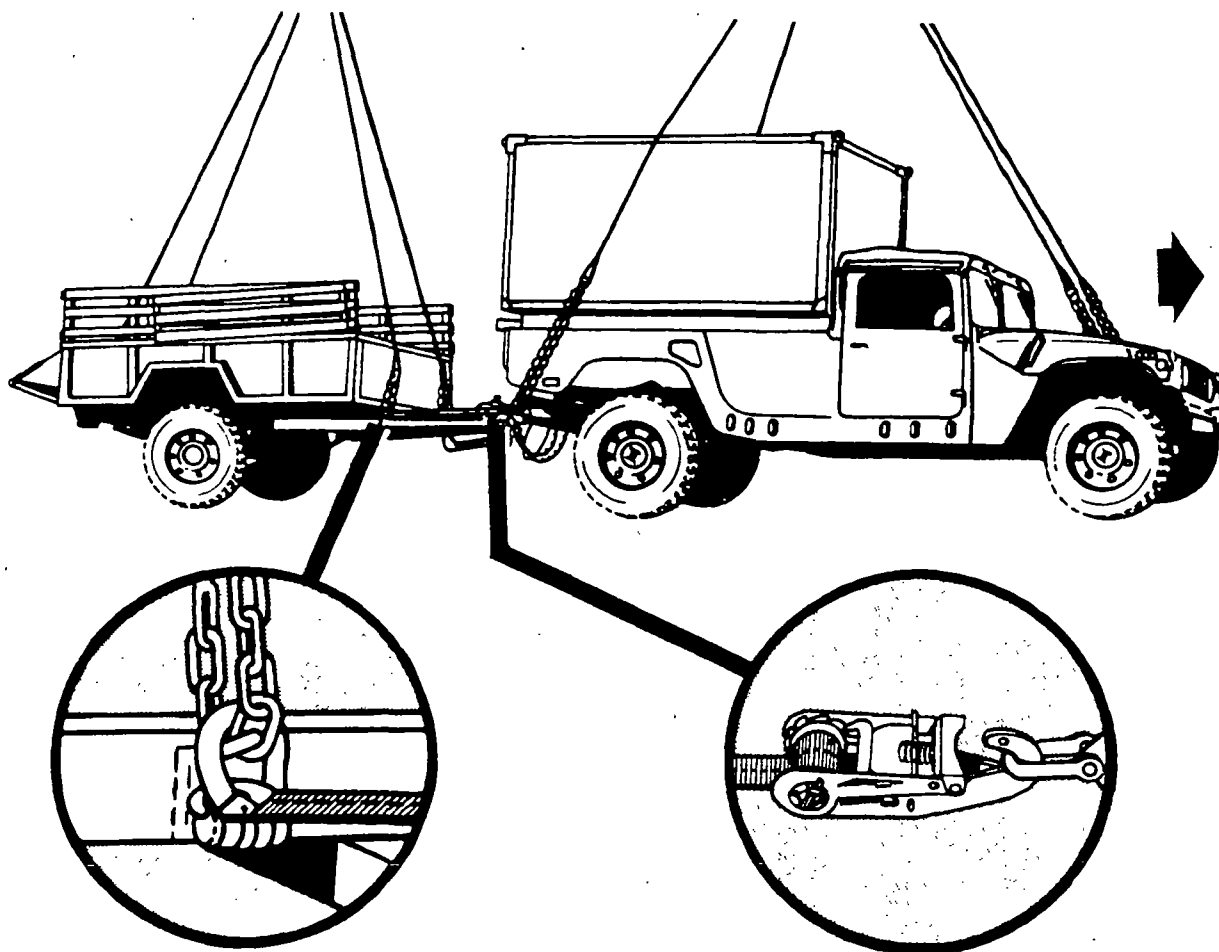
- Lift sling leg 3 and tie or tape (breakaway technique) grabhook or sling leg to the trailer side rack so the chain does not become slack and bind in the opening between the tailgate and trailer bed. Repeat with sling leg 4 on the other side rack.
- Cluster and tie or tape (breakaway technique) all sling legs together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

Two hookup teams are used for this load. The static wand person discharges the static electricity with the static wand. One hookup person kneels on top of the shelter and places the truck apex fitting onto the forward cargo hook. The other hookup person stands on the generator fender and places the generator set apex fitting onto the aft cargo hook. Do not use the center cargo hook. The hookup teams then carefully dismount each load and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



HOWITZERS AND WEAPONS SYSTEMS

The certified dual-point rigging procedures for howitzers are in this section. Figures 2-23 through 2-27 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-23. M101A1 Howitzer, 105-mm, with or without A-22 Cargo Bags

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters in configurations as identified under LOAD DESCRIPTION.

LOAD DESCRIPTION

LOAD	WEIGHT (pounds)	AIRSPEED (knots)
M101A Howitzer	4,980	120
M101A Howitzer with 1 A-22 Cargo Bag	7,180	120
M101A Howitzer with 2 A-22 Cargo Bag	9,380	120
M101A Howitzer with 3 A-22 Cargo Bag	11,580	120

MATERIALS

- Sling set (10,000-pound or 25,000-pound capacity) with one additional apex fitting (10,000-pound or 25,000-pound capacity to match sling set).

NOTE: The 25,000-pound capacity sling set is preferred; however, the 10,000-pound capacity sling set may be used for the howitzer (without accompanying A-22 cargo bag). Because of the additional weight of A-22 cargo bags, use the 25,000-pound capacity sling set if accompanying A-22 cargo bags are to be transported.

- Felt sheeting, as required.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Additional sling leg assemblies (2,500-pound capacity) from 10,000-pound capacity sling set (1 per A-22 cargo bag).
- Additional apex fitting (1 per accompanying load).

GUIDED MISSILE SYSTEMS

The certified dual-point rigging procedures for guided missile systems are in this section. Figures 2-27 through 2-33 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 2-27. M54A1/A2 Chaparral Launch Station

APPLICABILITY

This load is certified by the US Army NRDEC for CH-47D helicopters at airspeeds up to and including 100 knots.

LOAD DESCRIPTION

- M54A1 launch station, Chaparral air defense system, NSN 1425-01-074-6799.
- M54A2 launch station, Chaparral air defense system, NSN 1425-01-142-4576.
- Weight: 13,000 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig this load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Prepare the launch station for external air transport in accordance with TM 9-1425-2585-10-1.
- Rotate the missile pedestal 90 degrees from the centerline to avoid possible sling interference.

Step 2. Rigging

NOTE: The main power unit end of the platform is the front of the load for rigging purposes.

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the main power unit end of the platform.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located at the corners of the platform and insert link 3 in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling legs to the additional apex fitting (number 2). Position the apex fitting on the opposite end of the platform.
 - Loop the chain end of the left and right sling legs through their respective lift provisions located at the corners of the platform and insert link 3 in the grabhook.
- Cluster and tie or tape (breakaway technique) sling legs in each sling set together to prevent entanglement during hookup and lift-off.

Step 3. Hookup

NOTE: Brief the aircrew to hover to the side of the load and relax sling leg tension before releasing the apex fittings to prevent damage to the missile pedestal.

The hookup team stands on the back of the gunner's compartment. The static wand person discharges the static electricity with the static wand. The forward hookup person places apex fitting 1 onto the forward cargo hook. After the forward hook is connected, the aft hookup person places apex fitting 2 onto the aft cargo hook. Do not use the center cargo hook. The hookup team then carefully dismounts the missile platform and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

Figure 2-61. Communications or Electronic Systems Housed in S-280 Shelters

APPLICABILITY

The following systems are mounted in S-280 shelters and are certified by the US Army NRDEC for the identified helicopters up to the airspeeds denoted below.

LOAD DESCRIPTION

- AN/TSM-133, battery servicing shelter:
 - LIN S10034.
 - Weight: 5,240 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 130 knots.
- AN/TRC-138A, repeater set radio:
 - NSN 5820-01-161-9419.
 - Weight: 4,720 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 80 knots.
- AN/TRC-173, radio terminal set:
 - LIN R39452.
 - Weight: 3,790 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 80 knots.
- AN/TRC-174, repeater set radio:
 - LIN R39520.
 - Weight: 4,100 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 80 knots.
- AN/TRC-175, radio terminal set:
 - LIN R39588.
 - Weight: 4,690 pounds.

- Type helicopter: CH-47D.
- Airspeed: 80 knots.
- AN/TRC-179(V)1, regency net force terminal:
 - NSN: 5895-01-156-0411.
 - Weight: 8,200 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 110 knots.
- Meteorological data system (MDS) shelter:
 - Weight: 4,750 pounds.
 - Type helicopter: CH-47D.
 - Airspeed: 130 knots.
- AN/TSQ-129, position location reporting system master station:
 - Weight: 6,050 pounds.
 - Type helicopter: CH-53E.
 - Airspeed: 55 knots.
- AN/TSQ-158, enhanced position location reporting system net control station:
 - Weight: 6,289 pounds.
 - Type helicopter: CH-53E.
 - Airspeed: 55 knots.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Multileg sling set (15,000-pound capacity) (2 each).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

PERSONNEL

Two persons can prepare and rig each load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Secure all loose equipment inside the shelter with nylon cord or tape.
- Close and secure all hatches, vents, and access doors.
- Secure any external hoses, cables, ladders, and power unit components with nylon cord or tape.
- Secure the environmental control unit (ECU) panels with tape or nylon cord. Check the bolts that attach the ECU to the ECU frame for security.

Step 2. Rigging

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

NOTE: Either the shelter door end or the ECU end is designated as the forward end for rigging purposes and varies depending on shelter contents. The corner lift provisions (identified in the illustration) and the forward end are identified in the chart that follows.

- Forward sling set (2 sling legs):
 - Connect two sling legs to apex fitting number 1. Position the apex fitting/web ring on top of the shelter end that is identified as the forward end in the chart.
 - Loop the chain end of the left and right sling legs through their respective lift provision located on the corners of the shelter and insert the link identified in the chart in the grabhook.
- Aft sling set (2 sling legs):
 - Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting/web ring on top of the other end of the shelter.
 - Loop the chain end of the left and right sling legs through their respective lift provision located on the corners of the shelter and insert the link identified in the chart in the grabhook.

SHELTER	FORWARD END	TYPE OF SLING SET	CORNER LIFTING PROVISIONS			
			1	2	3	4
AN/TSM-133	Door	10,000 pound	30	30	3	3
AN/TRC-138A	ECU	10,000 pound	3		32	
AN/TRC-173	ECU	10,000 pound	3		32	
AN/TRC-174	ECU	10,000 pound	3		32	
AN/TRC-175	ECU	10,000 pound	3		32	
AN/TRC-179(V)1	Door	10,000 pound	30	30	3	3
MDS	ECU	10,000 pound	3	35	35	35
AN/TSQ-129	ECU	15,000 pound	3	25	25	25
AN/TSQ-158	ECU	15,000 pound	3	3	25	25

- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the shelter to prevent entanglement during hookup and lift-off.
- When rigging is complete, tie the lift rings upward by running 550-cord diagonally across the shelter roof to the lift rings. Ensure that the lift rings lay against the top edges of the shelter. Ensure that the 550-cord runs below the slings so that they are not fouled during hookup.

Step 3. Hookup

NOTE: Brief the pilot to relax sling leg tension and hover to the side of the load when releasing the apex fitting/web ring to prevent damage to the top of the shelter.

The static wand person discharges the static electricity with the static wand. The forward hookup person stands on the shelter forward end and places apex fitting/web ring 1 onto the forward cargo hook. The aft hookup person stands on the other end of the shelter and places apex fitting/web ring 2 onto the aft cargo hook. The hookup team then carefully dismounts the shelter and remains close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.

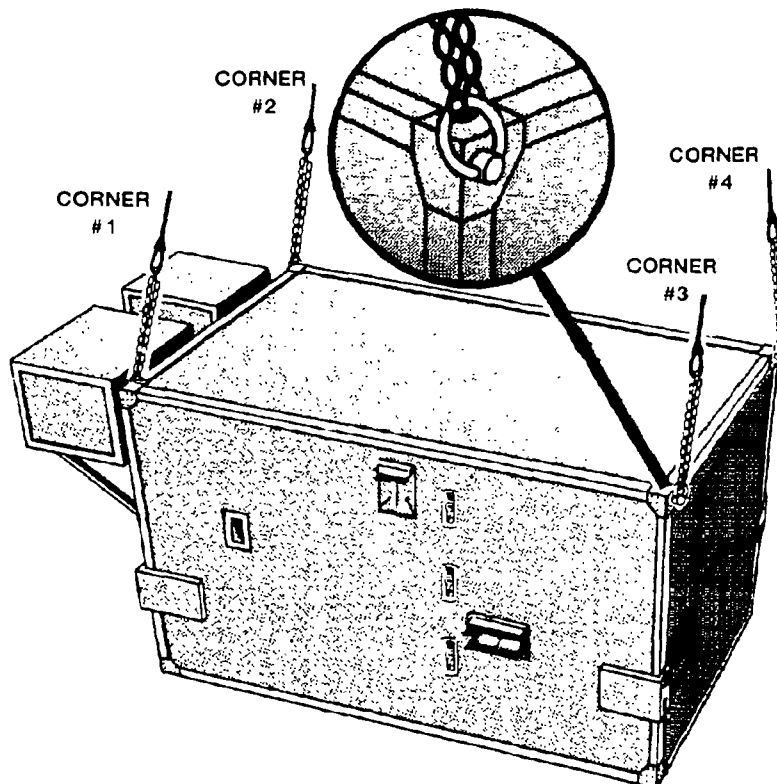


Figure 2-68. 8- x 8- x 20-Foot Shelter Systems

APPLICABILITY

The following 8- x 8- x 20-foot shelters are certified by the US Army NRDEC for CH-53E helicopters up to the airspeeds denoted below.

NOTE: Brief the pilot that these shelters tend to oscillate, particularly during turning maneuvers, and the recommended maximum airspeed applies to straight and level forward flight only.

LOAD DESCRIPTION

- AN/TGC-37, communications central:
 - TAMCN: A0268, NSN 5895-00-298-7374.
 - Weight: 16,733 pounds.
 - Airspeed: 80 knots.
- General purpose rigid shelter, 8- x 8- x 20-foot:
 - TAMCN: C6122, NSN 5411-01-209-3451.
 - Weight: 15,000 pounds (loaded).
 - Airspeed: 75 knots.
- Shelter, 8- x 8- x 20-foot, EMI:
 - TAMCN: C6112, NSN 5411-01-206-6078.
 - Weight: 15,000 pounds (loaded).
 - Airspeed: 70 knots.
- AN/TYQ-23, tactical air operations module (TAOM):
 - TAMCN: A2525, NSN 5892-01-127-8134.
 - Weight: 17,000 pounds (loaded).
 - Airspeed: 100 knots.
- AN/TSQ-107, radar surveillance center:
 - TAMCN: Q0900.
 - Weight: 9,950 pounds (loaded).
 - Airspeed: 70 knots.
- AN/TSQ-131, control and communications shelter:

- Component of TAMCN: Q2110.
- Weight: 14,050 pounds (loaded).
- Airspeed: 80 knots.

MATERIALS

- Multileg sling set (15,000-pound capacity) (2 each).
- Sling set (40,000-pound capacity) with one additional apex fitting (40,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.

NOTE: For load and sling set applicability, see chart below.

PERSONNEL

Two persons can prepare and rig each load in 20 minutes.

PROCEDURES

Step 1. Preparation

- Secure all loose equipment inside the shelter with tape or nylon cord.
- Close and secure all hatches and vents. Secure any external hoses, cables, ladders, and power unit components with tape or nylon cord.
- Secure access doors in the closed/locked position.

If the shelter is equipped with rings as lifting provisions, make sure that the rings remain upright to prevent over stressing the load pin. Place the four rings in their upright position. Using nylon cord or suitable substitute, tie the ring on corner 1 to the ring on corner 4. Tie the rings on the other opposite corners (2 and 3) together.

Step 2. Rigging

NOTE: The single personnel door is designated as either the forward end or the aft end for rigging purposes and varies depending upon shelter contents. The corner lifting provisions (shown in the figure) and the door position are identified in the chart.

NOTE: When using the 15,000-pound capacity multileg sling set, do not remove the two inner sling leg assemblies when rigging the forward or aft sling set. Tape the two inner unused sling legs to the two outer load-carrying sling legs.

- Forward sling set (2 sling legs):

- Connect two sling legs to apex fitting number 1. Position the apex fitting on top of the shelter end that is identified as the forward end in the chart.
- Loop the chain end of the left and right sling legs through their respective lift provision located on the corners of the shelter and insert the link identified in the chart into the grabhook.

NOTE: If the shelter has ISO lifting provisions, route the chain through the opening in the side of the provision and out through the front opening.

• Aft sling set (2 sling legs):

- Connect two sling leg assemblies to the additional apex fitting (number 2). Position the apex fitting on top of the other end of the shelter
- Loop the chain end of the left and right sling legs through their respective lift provision located on the corners of the shelter and insert the link identified in the chart into the grabhook.

NOTE: If the shelter has ISO lifting provisions, route the chain through the opening in the side of the provision and out through the rear opening.

- Secure excess chain with tape or nylon cord.
- Cluster and tie or tape (breakaway technique) the sling legs in each sling set on top of the shelter to prevent entanglement during hookup and lift-off.

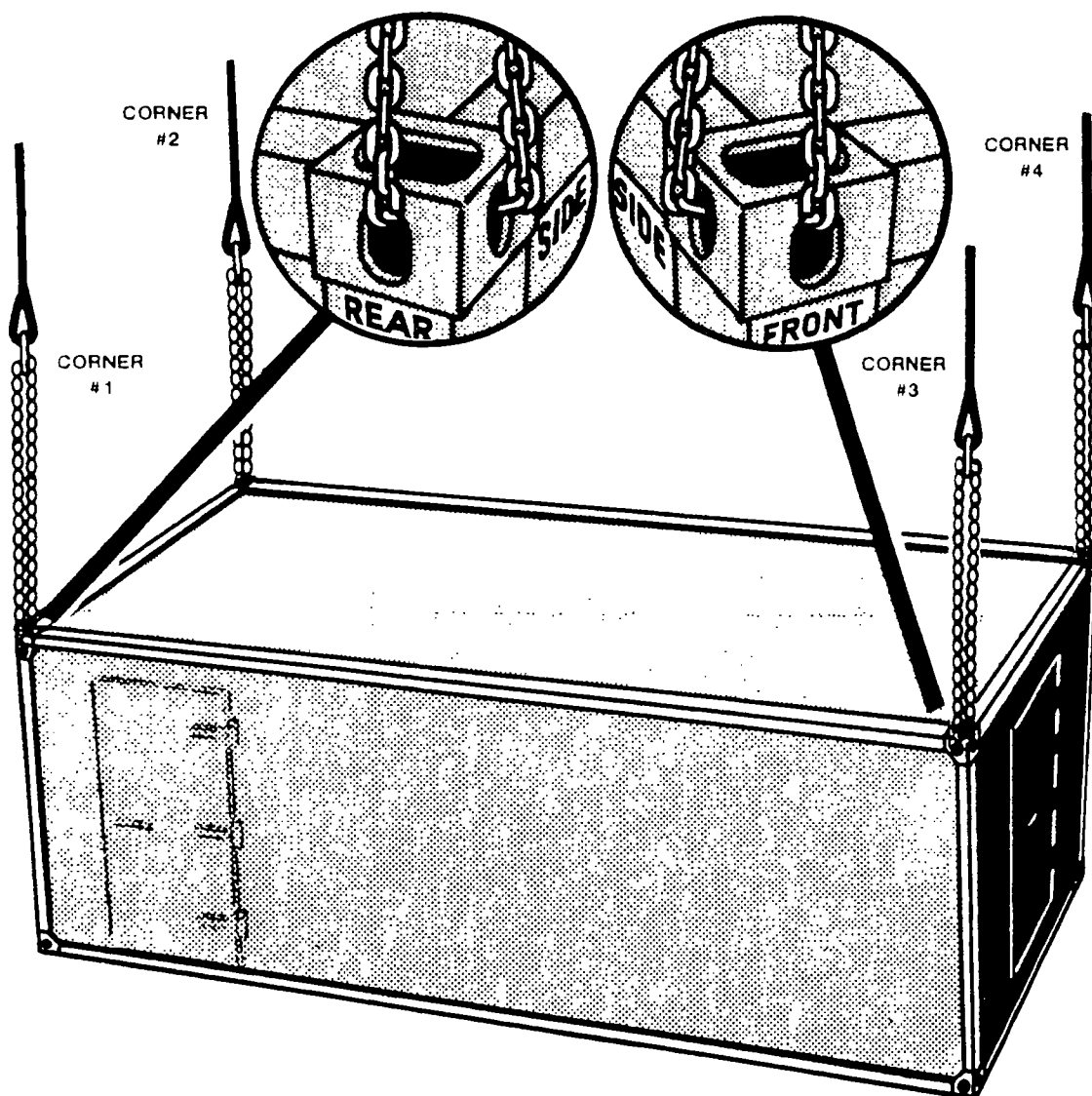
SHELTER	SINGLE PERSONNEL DOOR	TYPE SLING SET (POUNDS)	CORNER LIFTING PROVISIONS			
			1	2	3	4
AN/TGC-37	Aft	40,000	30	30	30	30
General Purpose Rigid	Forward	40,000	10	10	5	5
8 x 8 x 20 EMI	Forward	40,000	10	10	5	5
AN/TYQ-23	Forward	40,000	16	16	3	3
AN/TSQ-107	Forward	15,000	31	31	3	3
AN//TSQ-107	Forward	40,000	21	21	3	3
AN//TSQ-131	Forward	40,000	21	21	3	3

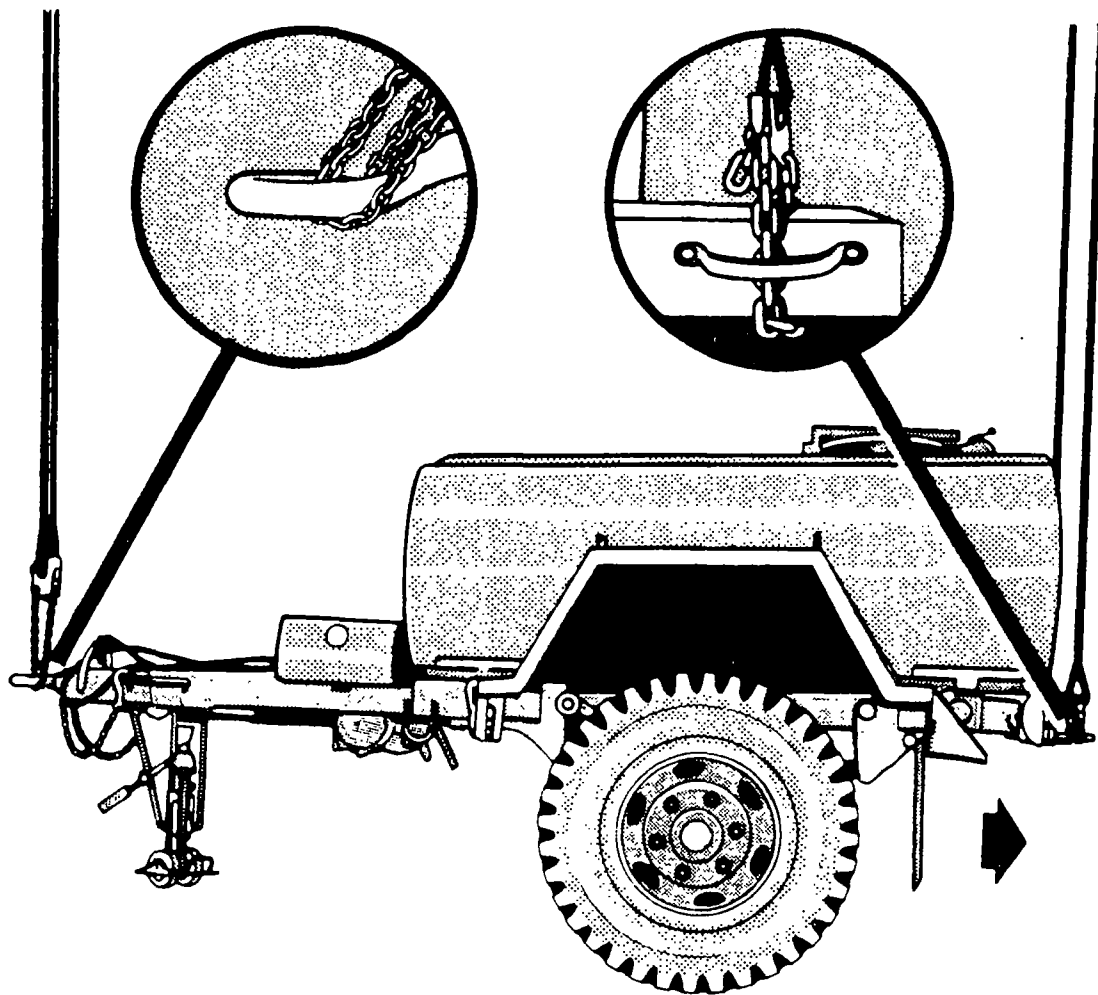
Step 3. Hookup

The forward hookup team (apex fitting 1) stands on the forward designated end of the shelter. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 1 onto the forward cargo hook. The aft hookup team (apex fitting 2) stands on the other end of the shelter. The static wand person discharges the static electricity with the static wand. The hookup person places apex fitting 2 onto the aft cargo hook. The hookup teams then carefully dismount the shelter and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup teams quickly exit the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.





HOWITZERS

The suitable dual-point rigging procedures for howitzers are in this section. Figure 3-4 gives detailed instructions for rigging loads. It also contains a description of the load and the materials required for rigging it.

Figure 3-4. M114A1 155-mm Howitzer

APPLICABILITY

This load is suitable for CH-47D helicopters at airspeeds up to and including 90 knots.

LOAD DESCRIPTION

- Howitzer, towed, 155-mm, M114A1, LIN K57803.
- Weight: 12,660 pounds.

MATERIALS

- Sling set (25,000-pound capacity) with one additional apex fitting (25,000-pound capacity).
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B, as required.
- Clevis assembly, large, MS 70087-3 (1 each).

PERSONNEL

Two persons can prepare and rig this load in 15 minutes.

PROCEDURES

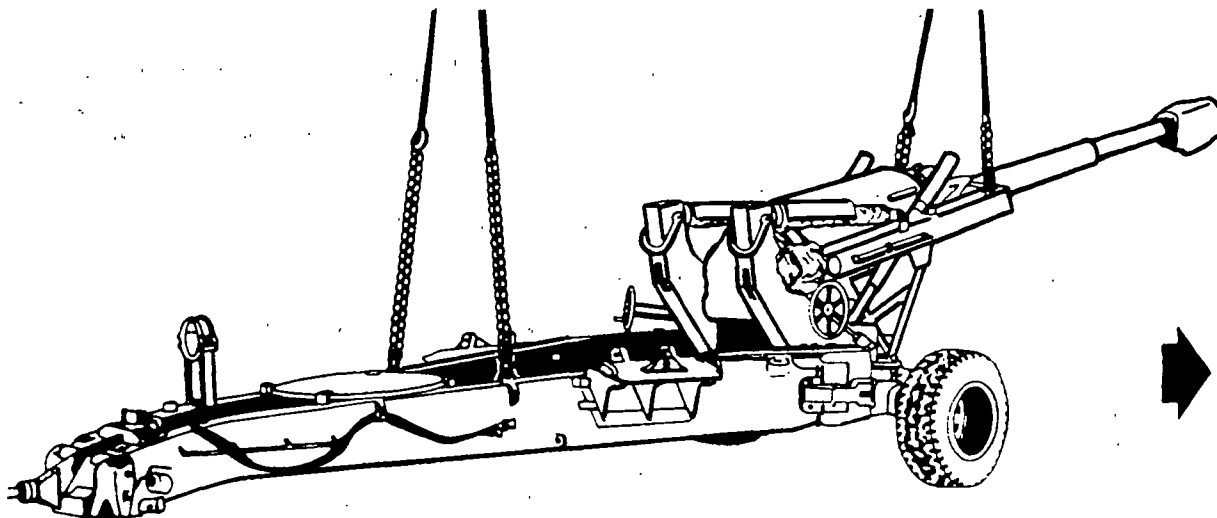
Step 1. Preparation

- Stow all howitzer equipment, including sights, in the proper place except the spade key. Stow spade key in section chest. Secure all equipment with tape or nylon cord.
- Secure the section chest on the rear of the trails by routing the tie-down strap through the handles of the chest and both trail lifting handles. Secure excess strap.
- Secure spades to brackets with nylon cord. Secure all cables and hoses to sides of trails with tape or nylon cord.
- Secure trail latching handle in the closed position with nylon cord and insert trail locking pin.

- Aft hookup team (trail end).
 - The hookup team stands on the firing base plate. The static wand person discharges the static electricity with the static wand. The hookup person places the apex fitting onto the aft cargo hook.
- The hookup teams then carefully dismount the howitzer and remain close to the load as the helicopter removes slack from the sling legs. When successful hookup is assured, the hookup team quickly exits the area underneath the helicopter to the designated rendezvous point.

Step 4. Derigging

Derigging is the reverse of the preparation and rigging procedures in steps 1 and 2.



CONTAINERS

The suitable dual-point rigging procedures for containers are in this section. Figures 3-5 through 3-6 give detailed instructions for rigging loads. The figures also contain a description of each load and the materials required for rigging it.

Figure 3-6. One CONEX Container

APPLICABILITY

This load is suitable for CH-47D helicopters at airspeeds up to and including 60 knots.

LOAD DESCRIPTION

- Box, metal, shipping, 295-cubic feet (CONEX).
- Weight: 1,578 pounds.

MATERIALS

- Sling set (10,000-pound capacity) with one additional apex fitting (10,000-pound capacity).
- Webbing, cotton, 1/4-inch, 80-pound breaking strength.
- Tape, adhesive, pressure-sensitive, 2-inch wide roll.
- Cord, nylon, Type III, 550-pound breaking strength.
- Tie-down strap, cargo, CGU-1/B (2 each).

PERSONNEL

Two persons can prepare and rig this load in 5 minutes.

PROCEDURES

Step 1. Preparation

- Close and secure doors with tie-down strap routed through the hinges and door handle. If hinges are not accessible, connect a second tie-down assembly to the first tie-down and route the strap around the container.

Step 2. Rigging

NOTE: Corners of container are designated numerically according to diagram to assist in rigging.

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